HP Performance Optimized Datacenter 40c G2 User Guide

Abstract

This guide is intended for the person who operates and maintains the HP Performance Optimized Datacenter 40c G2 (HP POD 40c G2).

Contents

Overview

Before you begin

For more information on site requirements, specifications, power requirements, management requirements, and supported facility connections, see the *HP Performance Optimized Datacenter 40c G2 Site Preparation and Requirements Guide*.

The actual location of various components or included subsystems in your HP POD 40c G2 might vary from what is described in this document. For information specific to your HP POD 40c G2, see the drawings included in the *Operations and Maintenance Manual for the HP Performance Optimized Datacenter 40c G2*.

Operator safety

The HP POD 40c G2 provides service access areas for periodic maintenance and service and is only to be used by owner-authorized personnel specifically trained in the maintenance and service of the HP POD 40c G2.

The HP POD 40c G2 is not a habitable structure suitable for long term personnel occupancy.

⚠ **WARNING:** To avoid the risk of personal injury or loss of life, all personnel must comply with PPE requirements when opening or working inside areas of the HP POD 40c G2 that are marked as hazardous voltage, per NFPA 70E in accordance with NEC (NA) and IEC (EMEA and APJ).

⚠ **WARNING:** To avoid the risk of personal injury, hearing protection must be worn at all times when working inside the HP POD 40c G2.

⚠ **WARNING:** To avoid the risk of personal injury or damage to the equipment, do not insert anything inside the electrical busways except the approved HP busway drop boxes.

The customer is responsible for completing any Environmental Health and Safety (EHS) evaluation of the HP POD 40c G2 or any attached structural component purchased through HP. The customer must complete an arc flash assessment of the HP POD 40c G2 and the associated electrical supply system for operation, maintenance, and so on.

Component safety

△ **CAUTION:** If the HP POD 40c G2 is shut down for an extended period of time, such as during routine maintenance, use desiccant units or materials to eliminate condensation within the HP POD 40c G2. Condensation causes damage to IT equipment and HP POD 40c G2 controls.

△ **CAUTION:** Electrostatic discharge might damage electronic components. Be sure that you are properly grounded (earthed) by wearing approved grounding straps before beginning any installation procedure or repair.

⚠ **CAUTION:** If any racks contain empty RU space, use the HP POD 40c G2 filler panels to maintain the efficiency of the HP POD 40c G2 thermal system. Filler panels are available from HP in 10-pack quantities (part number AQ682A) and 100-pack quantities (part number AS993A).

Fire detection and suppression

The fire suppression system, supplied as an optional component of the HP POD 40c G2, is a "Manufacturer Designed" system specifically for this HP product, in compliance with national standards.

The HP standard suppression system includes a Novec 1230 clean agent system. However, if the customer or local AHJ requires specific modifications or a replacement, HP can assist in these actions at the expense of the customer.

HP does not certify that the fire suppression system installed in the HP POD 40c G2 meets all local and jurisdictional requirements. The customer is responsible for the following actions as related to the fire suppression system:

- Verifying that the POD suppression system meets local codes, including specific local requirements for initial and periodic inspections.

- Arranging for and receiving all required local permits, including initial commissioning as well as standard and repair maintenance.

- Arranging for the connection of the agent tanks, refilling of tanks, and all system testing, including pressure tests. All general maintenance of the suppression system must be completed by an authorized technician.

Additional local requirements are not covered as part of the option price or basic installation and deployment services, unless specifically included in an executed Statement of Work.

Environmental considerations

⚠ **CAUTION:** To maintain accurate environmental conditions and minimize condensation inside the HP POD 40c G2, do not leave the HP POD 40c G2 doors open during operation.

Component identification

Structural component identification

The HP POD 40c G2 documentation frequently refers to the specific components of the HP POD 40c G2 as shown in the following figure and described in the following table.
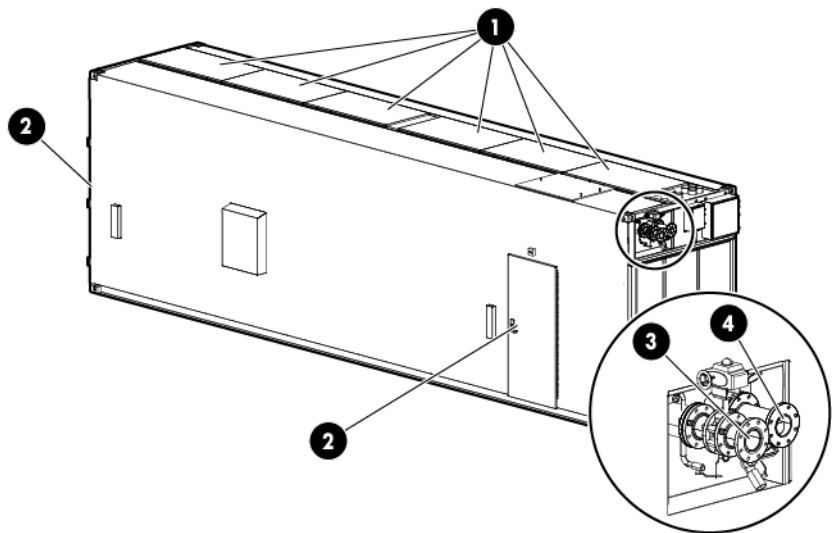
Item	Component	Description
1	Heat exchanger access hatches	Provides access to the overhead heat exchangers
2	Personnel access doors	Provides access to the POD
3	Facility chilled water return	Facilitates the return of chilled water to the POD
4	Facility chilled water supply	Facilitates the supply of chilled water to the POD

Parts and part number identification

Review the contents of the HP POD 40c G2 to identify the following for each component:

- **Model number**—The model number is located on the door to the control panel inside the cold aisle of the HP POD 40c G2, as shown in the following figure.

- **Regulatory compliance identification number**—This product has been assigned a unique regulatory model number and is located on the door to the control panel inside the cold aisle of the HP POD 40c G2, as shown in the following figure.
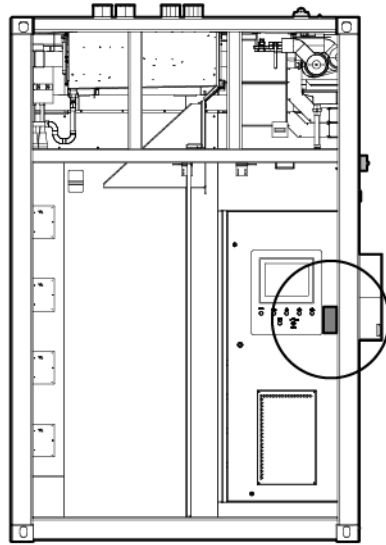
- **CSC Safety Approval placard**—Each HP POD 40c G2 has a CSC Safety Approval placard that includes the model number, serial number, and proof load. The CSC Safety Approval placard is located on the cargo end of the HP POD 40c G2, as shown in the following figure.
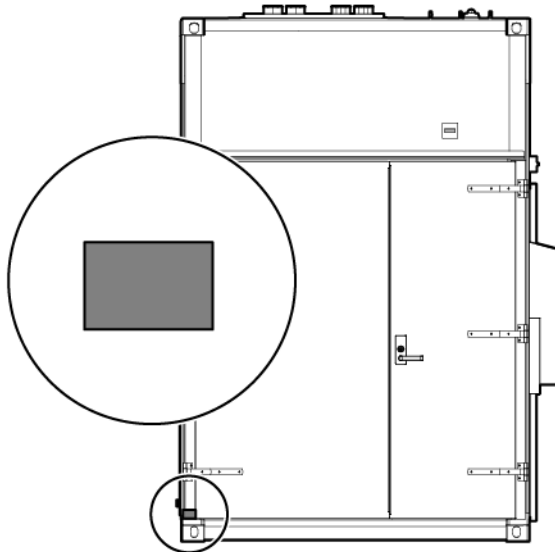
Life safety component identification

Internal life safety components

Top view shown
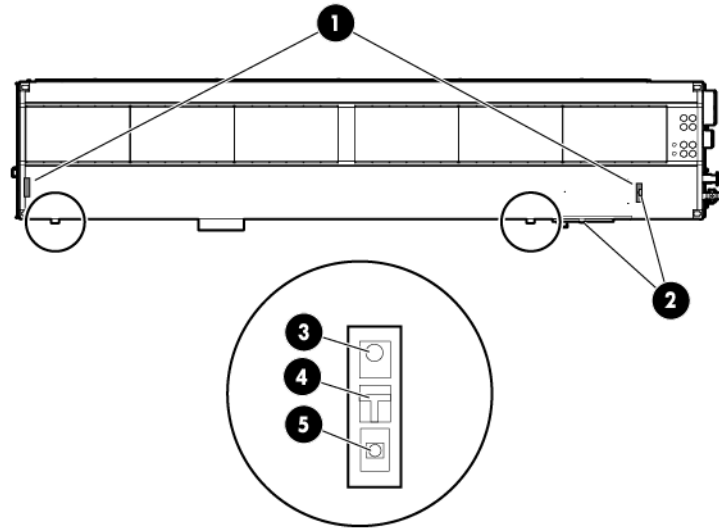
Item	Component	Description
1	Exit sign locations	Indicates the location of an exit
2	Fire strobe light	Indicates a fire alarm condition within the HP POD 40c G2
3	EPO button	Disconnects the HP POD 40c G2 from main power feeds
4	Fire alarm manual pull*	Enables manual initiation of the fire system, which includes activating the interior and exterior fire strobe lights and the optional fire suppression system
5	Fire suppression abort button*	Aborts the fire suppression system. A fire suppression abort button is located next to each personnel door.

*This is an optional component that might not be included.

Exit sign locations

The exit signs within the HP POD 40c G2 contain tritium. For information about the regulatory requirements regarding the handling, transfer, and disposal of the signs, see "Regulatory requirements for EXIT signs (on page 78)."

Top view shown
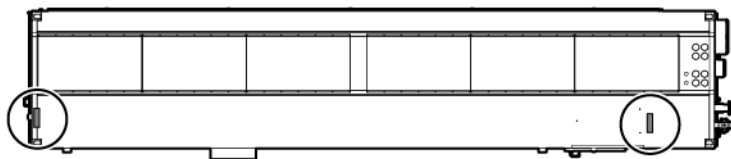
External emergency status indicators

The HP POD 40c G2 has one external fire strobe light that indicates a fire alarm condition.

Top view shown
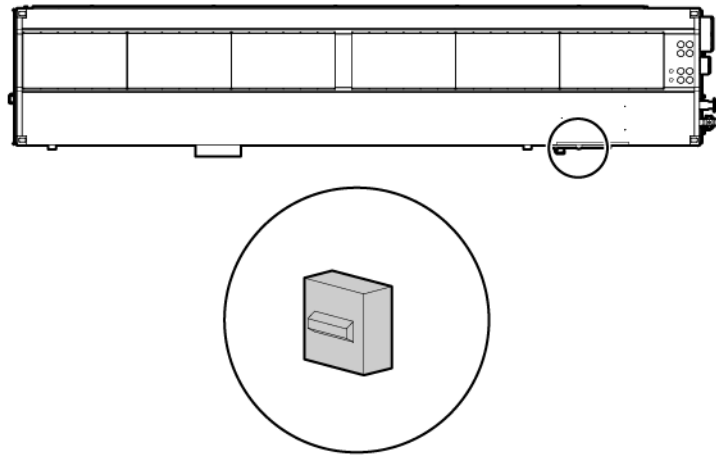
Electrical power component identification

Front view shown
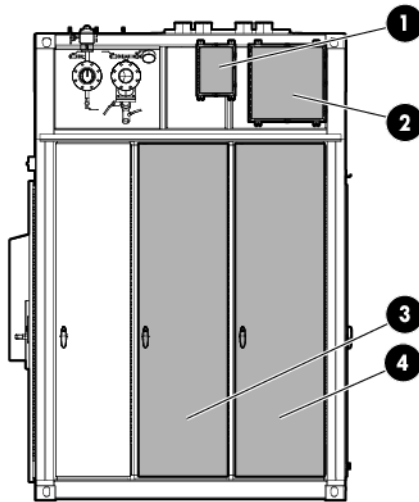
Item	Component	Description
1	Fire box*	Connection location for fire emergency and VESDAnet signals
2	Demarcation box*	Customer communication connection point for the following components: ● ECS ● Security ● Phone
3	415 Y/240 V 3-phase, 4-wire, 800 A electrical panel	Feed A power for critical IT loads (electrical busways) and house power

Item	Component	Description
4	415 Y/240 V 3-phase, 4-wire, 800 A electrical panel	Feed B power for critical IT loads (electrical busways) and house power

*The demarcation box and the fire box are communication data points that are provided on the POD by HP. Connecting these data points is the responsibility of the customer, unless an approved Statement of Work is initiated.

External panel labels

Front view shown
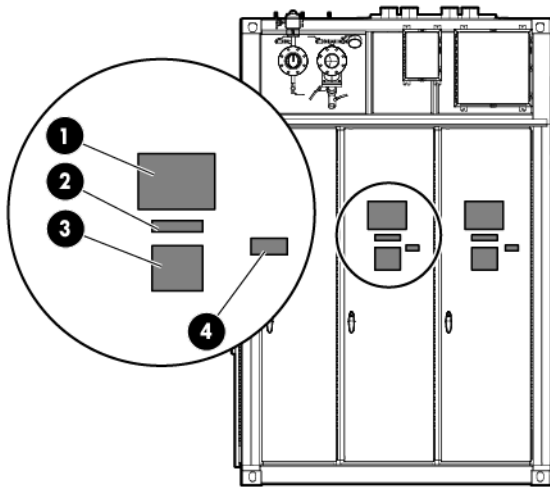
Callout	Electrical safety label	Description
1	Danger sign	Provides a reminder to users that the electrical panels must be accessed only by authorized personnel
2	Disconnect label	Provides the order for disconnecting all of the electrical panels
3	Caution	Cautions users about isolating power from the HP POD 40c G2
4	Arc flash warning	Provides a reminder to users of the danger of arc flash and required PPE

Internal panel labels

Front view shown
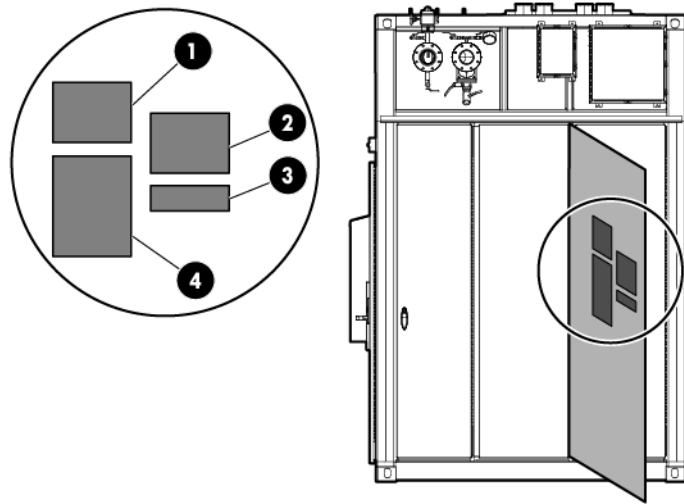
Item	Electrical safety label	Description
1	Input power	Lists the input power information
2	Panel schedule/circuit breaker table	Lists the layout and designation for all circuit breakers on the panel
3	Fuse type table	Lists all fuse type and sizes
4	Wire color code (on page 27)	415Y/240V color codes • Purple/Brown—Phase A/L1 • Purple/Orange—Phase B/L2 • Purple/Yellow—Phase 3/L3 • Purple/White—Neutral • Green and yellow—Equipment ground

Control cabinet component identification

Item	Component	Description
1	VESDA air sampling smoke detection unit	An early warning laser scan smoke detection unit
2	VESDA power supply with battery backup	Provides power to the VESDA and backup power to the VESDA during a utility power loss
3	Fire alarm and suppression release control panel	- Controls all fire systems within the HP POD 40c G2, including the smoke detection system, fire suppression system, fire pulls, and so on - Includes a battery backup system that provides backup power to the fire system during a utility power loss
4	Customer connection box	Controls and organizes information monitored by the HP POD 40c G2 security components
5	ECS relays and ECS modules	Relays for the ECS control, ECS communications, I/O connections, and terminal block connections
6	EPO controller board and house panel fuses	Connections for the EPO system and fuses for other house panel components
7	Dual power supplies with battery backup	Provides 24 V DC power to the PLC, LED lighting, and ECS systems
8	Battery backup power supply	Provides 24 V DC power to the PLC and ECS system
9	240/120 V transformer	Provides house power to the convenience outlets
—	PLC	The computer that controls the ECS system (located on the inside door of the control cabinet)

HP POD 40c G2 racks

The HP POD 40c G2 contains a total of 20 IT racks.

△ **CAUTION:** If any racks contain empty RU space, use the HP POD 40c G2 filler panels to maintain the efficiency of the HP POD 40c G2 thermal system. Filler panels are available from HP in 10-pack quantities (part number AQ682A) and 100-pack quantities (part number AS993A).

For more information about racks and network cabling, see the *HP Performance Optimized Datacenter Networking Guide*.

Life safety systems

Life safety overview

The HP POD 40c G2 has multiple life safety systems that all work together to protect the HP POD 40c G2 equipment and personnel. The following life safety systems are available on the HP POD 40c G2:

- EPO system (on page 16)
- VESDA air sampling smoke detection system (on page 19)
- (Optional) fire suppression system (on page 20)
- Emergency egress (on page 21)
- ECS connection to customer emergency systems

EPO system

If the HP POD 40c G2 must be shut down during an emergency, the EPO system automatically shuts off all power to the HP POD 40c G2 and activates the EPO indicator on the ECS panel door.

To ensure that all rack-mounted UPS devices are shut down during an EPO event, be sure that each rack-mounted UPS device is connected to the HP POD 40c G2 EPO system.

The EPO system can be activated two ways:

- Excessive high temperature in the hot aisle—The HP POD 40c G2 includes two thermisters. If both thermisters reach 60°C (140°F), an EPO shutdown is triggered automatically. One thermister is located in zone 2 and one thermister is located in zone 5.
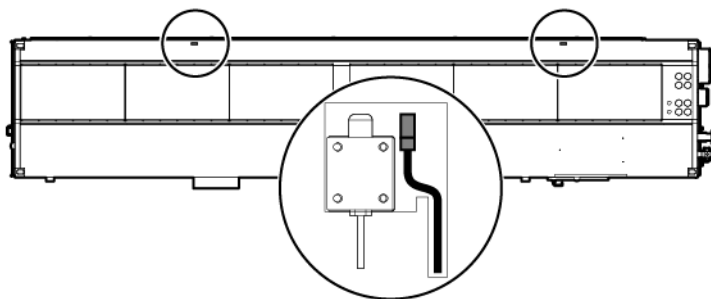
- Manual initiation—To manually trigger an EPO shutdown, press at least one of the EPO buttons. Both EPO buttons are located on the POD interior. One button is located near the main exit and the second button is located near the emergency exit on the cargo end.

  For the location of EPO buttons, see "Life safety component identification (on page 9)."

The EPO system must be reset before you can power up and restart the HP POD 40c G2. To reset the EPO system:

1. Verify that the key control for the EPO mode is in the Armed position.
2. Press the white **EPO Reset** button.

If you triggered the EPO system manually, you must reset the EPO button that you pressed to the Active position.

ECS touchscreen and EPO indicators

The ECS touchscreen and EPO indicators are located on the door to the control panel.

The touchscreen enables you to easily configure the environmental parameters, access data, and monitor environmental, life safety, and security conditions within the HP POD 40c G2.

The EPO indicators provide EPO status. The EPO key control and EPO reset button enable you to adjust the EPO system mode.
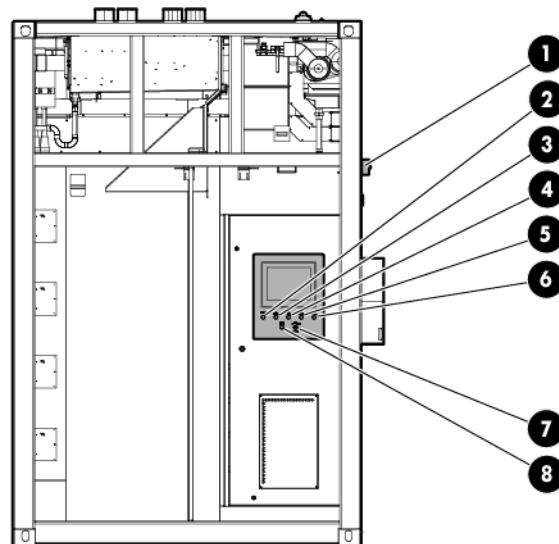
Item	Component	Indicator color	Description
1	External EPO status indicator	• White—Normal operating mode • Yellow—EPO cover open alarm or EPO system operating in test mode • Red—EPO shutdown	Indicates the operating status of the HP POD 40c G2
2	Power on	White	Indicates the EPO power status
3	EPO shutdown	Red	Indicates an EPO shutdown or alarm situation
4	EPO armed	White	Indicates that the EPO system is armed and operational
5	EPO test mode	Yellow	Indicates that the EPO system is operating in test mode or that an EPO cover is open
6	EPO bypassed	Green	Indicates that the EPO functionality and shutdown is bypassed

Item	Component	Indicator color	Description
7	EPO mode	Key control	Enables you to select the EPO mode: • Armed • Test • Bypass For more information, see "EPO modes (on page 18)."
8	EPO reset	White button	Resets the EPO system when pressed

EPO modes

The EPO system has three operating modes:

- Armed—The EPO system is armed and operational.

- Test—The EPO system is in test mode and does not initiate during events that normally trigger an EPO.

- Bypass—The EPO system is non-operational and does not initiate during events that normally trigger an EPO.

EPO accidental activation

To help prevent accidentally pressing the EPO button and activating the EPO system, each EPO button is covered with a clear Lexan cover.

Battery backup during an EPO event

The following components are equipped with a UPS to ensure that service is not interrupted during a loss of power to the HP POD 40c G2:

- ECS system

- VESDA air sampling smoke detection system

- Optional fire suppression system

- Emergency lighting in the HP POD 40c G2

Fire protection system

Each HP POD 40c G2 is equipped with a fire alarm panel that is integrated with the fire detection system and the optional fire suppression system.

The fire system is designed as a stand-alone system, but can also interface with customer site fire alarm systems. Customer site connections are the responsibility of the customer. Consult with HP for connection locations.

The fire protection system includes:

- Manual fire pulls (on page 19)

- Fire alarm indicators (on page 19)

- VESDA air sampling smoke detection system (on page 19)

- (Optional) Fire suppression system (on page 20)

Manual fire pulls

The HP POD 40c G2 includes two fire pulls. One fire pull is located next to the personnel access door and the second fire pull is located next to the emergency exit.

Manually activating a fire pull does the following:

- Activates the POD fire alarm system horn and strobe lights
- Triggers a fire alarm signal to the BMS in the fire box (on page 63) and activates a 30-second delay before releasing the fire suppression agent

> **IMPORTANT:** The fire suppression abort button will not delay the release of the fire suppression agent if a manual fire pull is initiated. All personnel should evacuate immediately.

Fire alarm indicators

Upon activation of a fire alarm within the HP POD 40c G2, the following alarms alert personnel:

- Strobe lights
  - Internal—The HP POD 40c G2 includes one fire strobe light located in the cold aisle.
  - External—The HP POD 40c G2 includes one fire strobe light located at the standard personnel entry door.
  - Optional—There is an additional fire strobe light located in the cold aisle that can be connected to the site fire alarm system at the expense of the customer.
- Audible horn—The HP POD 40c G2 includes two integrated horns. One horn is located on the internal strobe light and the second horn is located on the optional strobe light.
- Alarm within the ECS—The ECS system notifies you of a fire alarm condition with an alarm alert on the ECS screen.

VESDA air sampling smoke detection system

> **CAUTION:** Excess dust within the HP POD 40c G2 can cause the VESDA smoke detector to trigger a fire alarm.

The VESDA system features a single zone laser scan early warning smoke detector to provide the earliest warning of a potential fire.

The orange VESDA conduits that run throughout the HP POD 40c G2 include inlets for smoke sampling. The VESDA uses a high-efficiency aspirator to continuously draw in air from the HP POD 40c G2 and circulate the air through a dual-stage filter:

- Stage 1—Dust and dirt are removed from the air sample.
- Stage 2—Remaining contaminants in the air sample are removed with an ultra-fine filter.

After the air passes through the dual-stage filter, it enters a calibrated detection chamber where a laser scans the air sample for the presence of smoke. When the smoke concentration reaches the first setpoint, the VESDA system will send an alarm signal indicating that a fire might exist. When the smoke concentration reaches the second setpoint, the VESDA system indicates that a fire does exist in the HP POD 40c G2 and sends an activation signal to the fire suppression system.

IMPORTANT: The VESDA filter must be changed regularly to ensure accurate smoke detection readings. For more information about changing the VESDA filters, see the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide*.

(Optional) Fire suppression system

CAUTION: The POD fire suppression system is manufacturer designed, engineered, and installed to comply with national standards. However, HP does not certify that the installed fire suppression system meets all local jurisdiction requirements. Compliance with local codes is your responsibility, and includes specific local requirements for initial and periodic inspections, certifications, and maintenance.

Any additional local requirements are not covered as part of the option price or basic installation and deployment services, unless specifically included in an executed Statement of Work.

WARNING: Fire suppression agents include a pre-discharge warning and evacuating system. In the event of a fire, all protected space must be evacuated as soon as possible.

IMPORTANT: The fire suppression abort buttons that are located next to each personnel door can be pressed to interrupt the 30-second fire suppression agent release delay for an additional 30 seconds. This button interrupts the countdown, but does not reset the 30-second fire suppression agent release delay. The fire suppression agent release countdown will continue when the abort button is released until the time is exhausted and the fire suppression agent is released.

The fire suppression system contains conventional fire alarm control circuits and includes features required for single or dual-hazard suppression release applications, including a low-toxicity agent. In the event of fire suppression release, the suppression tanks must be refilled by a certified technician.

Fire system operator panel

The panel is configured by the manufacturer in accordance with the local fire marshal and fire code requirements.

The operator panel includes the following:

- Alarm status LED
- Trouble status LED
- Input status LED
- Output status LED
- Acknowledge button
- Alarm Silence button
- System Reset button

The fire system and panel are tested by the local certified fire system supplier and witnessed and certified by the local AHJ or fire marshal.

The fire system operator panel requires regular maintenance and service. For more information on the fire system operator panel component, see the *Operation and Maintenance Manual for the HP Performance Optimized Datacenter 40c G2*.

Fire suppression sequence of operations

After the fire suppression system is activated by a VESDA signal or a manual fire pull, a 30-second countdown begins before the fire suppression agent is released to the HP POD 40c G2 interior through the fire system piping.

VESDA initiation

Press the fire suppression abort button to interrupt the fire suppression release countdown for 30 seconds. The abort button can be pressed multiple times to interrupt fire suppression release agent countdown for an additional 30 seconds until the 30-second fire suppression release countdown has been exhausted.

Press and hold the abort button to stop the immediate activation of the fire suppression system until the button is released. When the button is released, the 30-second delay will begin. The remaining fire suppression release agent countdown will continue after the 30-second delay until the time is exhausted.

Manual initiation

The fire suppression abort button will not delay the release of the fire suppression agent if a manual fire pull was activated. All personnel should immediately evacuate.

Emergency egress

The HP POD 40c G2 includes the following features for life safety egress on all access doors:

- Panic bar
- Door strikes
    - o   Standard hardware—Door strikes
    - o   Optional hardware—Electric door strikes

Each personnel door includes a standard panic bar to ensure safe exit. The optional egress hardware included in the HP POD 40c G2 (including electric panic bars, electric strikes, and magnetic locks) are tied to the fire alarm to enable uninhibited egress in the event of an emergency.

Power, electrical, and controls

Site electrical system

To ensure a complete and safe integration of the HP POD solution with your facility, HP requires that you complete the following actions for the installed electrical system prior to the installation of the HP POD solution:

- Short circuit analysis
- Arc flash study
- Circuit breaker coordination study

These actions must be performed for all associated parts of the electrical power train. The majority of the details and factors required to complete these studies are associated with the existing installed facility infrastructure.

> ⚠ **CAUTION:**   Failure to complete these studies can cause serious issues with the electrical integration of the POD into your electrical system.

Power safety

> ⚠ **WARNING:**   To avoid the risk of personal injury or loss of life, all personnel must comply with PPE requirements when opening or working inside areas of the HP POD 40c G2 that are marked as hazardous voltage, per NFPA 70E in accordance with NEC (NA) and IEC (EMEA and APJ).

Grounding

> ⚠ **WARNING:**   To avoid the risk of personal injury or electric shock, the HP POD 40c G2 must be properly grounded per NFPA 70 in accordance with NEC (NA) and IEC (EMEA and APJ).

The HP POD 40c G2 must be properly grounded to the earth to ensure a common return path for electric current, limit the build-up of static electricity, and absorb an unlimited amount of current without changing its potential. To properly ground the HP POD 40c G2 to the earth, you must connect the POD to building steel, a ground rod, or a properly installed ground well that is connected to a building's grounding system. The grounding electrode conductor connection point is located on the cold aisle side adjacent to the power cabinet.

A certified electrician must test and verify that the HP POD 40c G2 is properly grounded.
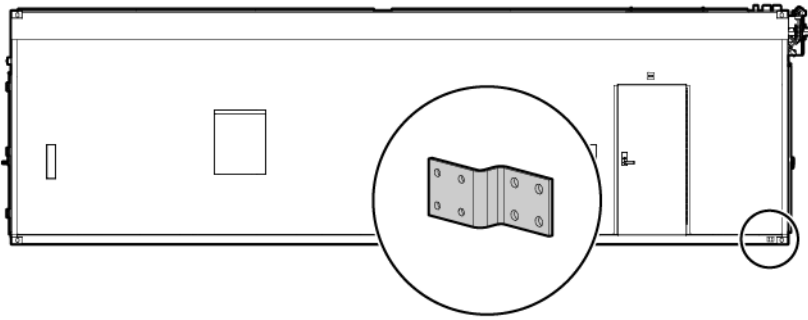
Lightning protection

The HP POD 40c G2 structure and internal components are all bonded together. A common Grounding Electrode Conductor Connection point is provided. Proper bonding and grounding of the HP POD 40c G2 minimizes the effects of a lightning strike. A surge protection device is provided on the HP POD 40c G2 input connection to protect the HP POD 40c G2 electrical system from voltage transients. If your site is in an area that is subject to frequent lightning strikes, the HP POD 40c G2 must be protected in accordance with NFPA 70 (NA) and IEC (EMEA and APJ). HP recommends that you contact a certified lightning protection consultant.

Capacities

HP POD 40c G2 capacity limitations

The capacity limitations for the HP POD 40c G2 are separated into two categories: electrical power and mechanical cooling capacities. Both of these categories are interdependent and must be considered in conjunction with the overall customer requirements.

Electrical and mechanical cooling capacities

Feature	Specification
Critical IT electrical connections	2 x 800A feeders at 415Y/240 V, 3-phase, 4-wire, with equipment ground conductors 10.2 x 10.2 cm (4 x 4 in) conduit fittings per feeder provided
Critical IT power capacity	2N Redundant—576 kW
Mechanical cooling electrical connections	Not applicable Power for the cooling system fans comes from house power.
Mechanical cooling capacity	• N+1 Redundant—400 kW • Non-redundant—600 kW

Power feeders

> **IMPORTANT:** A licensed electrician must connect the power according to all local and national electrical codes, and must comply with manufacturer specifications.

The HP POD 40c G2 has eight power feeder couplings that provide the entrance for power to the POD. The power feeders route into the top of each electrical panel on the end of the HP POD 40c G2.

Top view shown
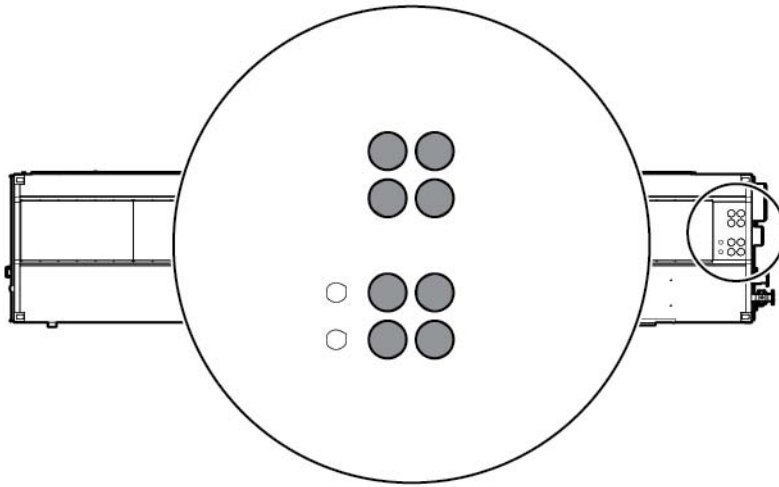
The top of each electrical panel has four 10.16 cm (4 in) welded couplings where the power feeders are connected.

Power feeders are sized in accordance with NEC and IEC regulations.

Electrical panels

⚠ **WARNING:** To avoid the risk of personal injury or loss of life, all personnel must comply with PPE requirements when opening or working inside areas of the HP POD 40c G2 that are marked as hazardous voltage, per NFPA 70E in accordance with NEC (NA) and IEC (EMEA and APJ).

⚠ **WARNING:** To avoid the risk of personal injury or loss of life, all personnel must comply with electrical warning labels when operating and maintaining the electrical panels and systems of the HP POD 40c G2.

For the external electrical power component locations, see "Electrical power component identification (on page 11)."

Main breaker locations

Front view shown
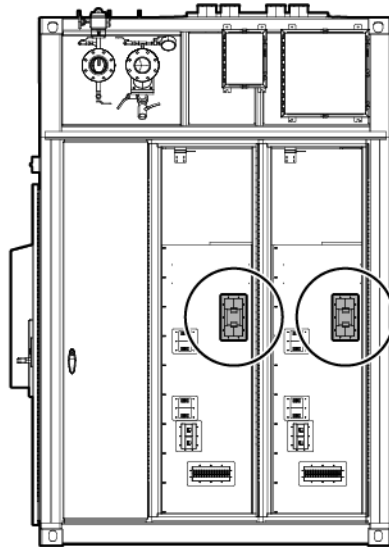
Arc flash safety

The customer must complete an arc flash assessment of the HP POD 40c G2 and the associated electrical supply system for operation, maintenance, and so on.

Power distribution: Electrical busway system

The rack power distribution system for the HP POD 40c G2 is protected by electrical circuit breakers located on the end of the HP POD 40c G2.

End view shown
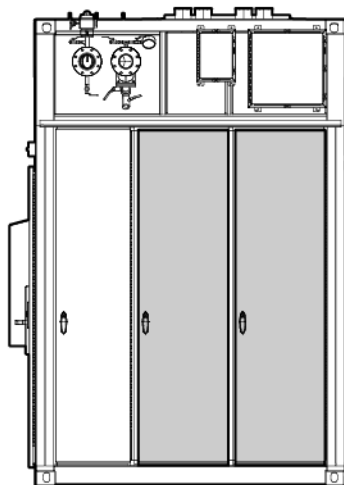
Feature	Specification
Number of busways	8

Feature	Specification
Frequency	60 Hz
Amps (per busway)	200 A
Voltage (per busway)	415 V
Grounding	Copper
Busway conductors	3-phase + neutral + equipment ground

Panel schedules

The panel schedule for each electrical panel is permanently affixed to the inside cabinet door of each electrical panel.

Wire color code

📝 **IMPORTANT:** UL-approved colored tape over another color of wire is only acceptable on wire sizes #2 and larger.

120 V wiring system—Power required for the transformer in the control cabinets

Wire color	Description
Black	Single-phase current carrying conductor
White	Neutral
Green or green and yellow	• Equipment grounding conductor • Bonding conductor • Earth ground

415 V wiring system—Power required for the electrical busway feeders

Wire color	Description
Brown and violet	A Phase/L1
Orange and violet	B Phase/L2
Yellow and violet	C Phase/L3
White and violet	Neutral
Green or green and yellow	• Equipment grounding conductor • Bonding conductor • Earth ground

Control cabinet power components
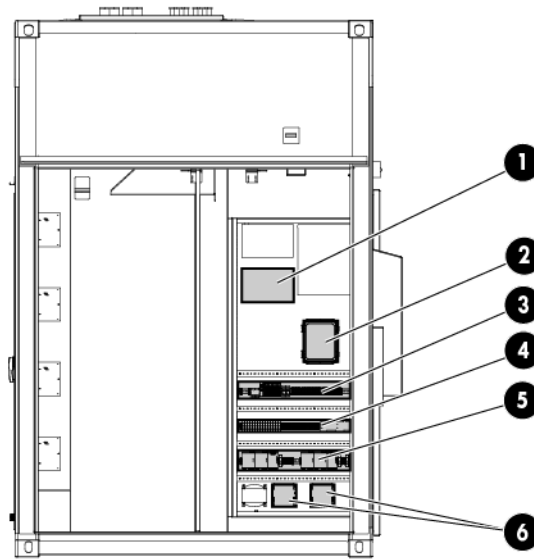
Item	Component	Description
1	VESDA power supply and battery backup	Provides power to the VESDA as well as backup power during a power failure
2	Customer connection box	Controls and organizes information monitored by the HP POD 40c G2 security components
3	ECS modules and relays	Relays for the ECS control, ECS communications, I/O connections and terminal block connections
4	EPO controller board and house panel fuses	Connections for the EPO system and fuses for other house panel components
5	Dual power supplies with battery backup	Provides 24 V DC power to the PLC and ECS systems
6	Battery backup power supply	Provides 24 V DC power to the PLC and ECS systems

Electrical busways

The electrical busway is a modular, overhead electrical distribution system that supplies power to the HP POD 40c G2 IT loads. The HP POD 40c G2 includes eight busways, and each busway can support 200 A.

Top view shown
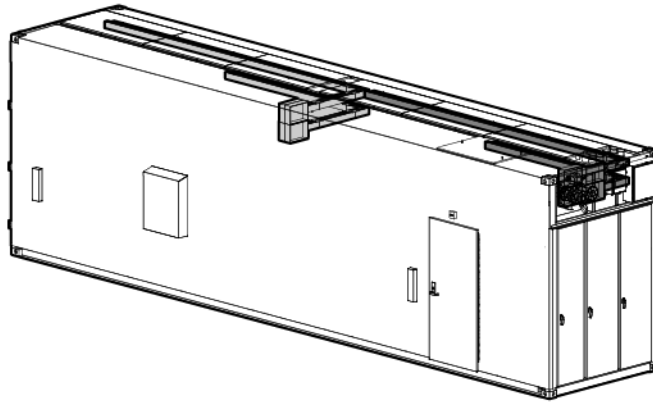
The HP POD 40c G2 electrical busways can be configured for non-redundant power or redundant power. The HP POD 40c G2 can be installed as a single source 1N load by providing all required feeders from one common power source and from common switchboards and transformers. A 2N redundancy installation is configured by feeding the parallel power paths from independent power sources, switchboards, and transformers.

- **Non-redundant power installation (1N load)**—All eight busways are powered from the same power feed.
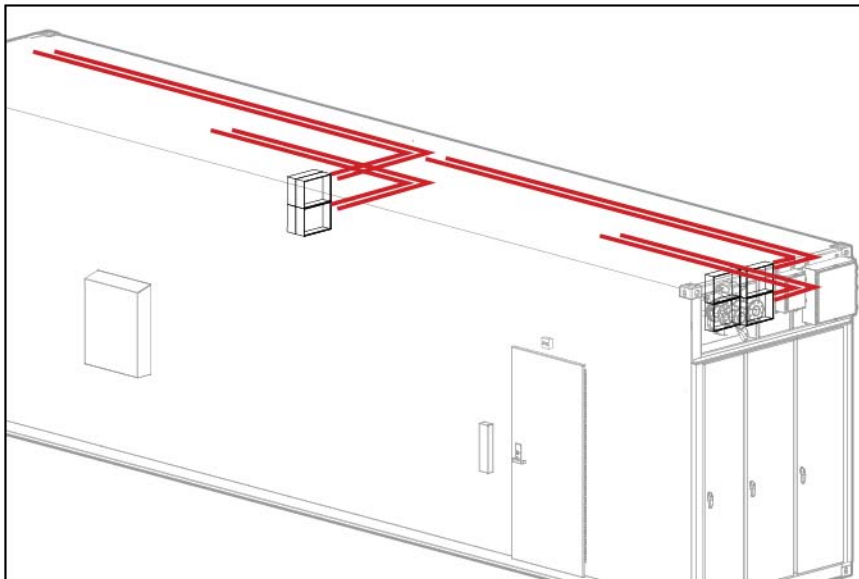
- **Redundant power installation (2N load)**—Four busways are powered from one power feed, and the remaining four busways are powered from a different power feed.
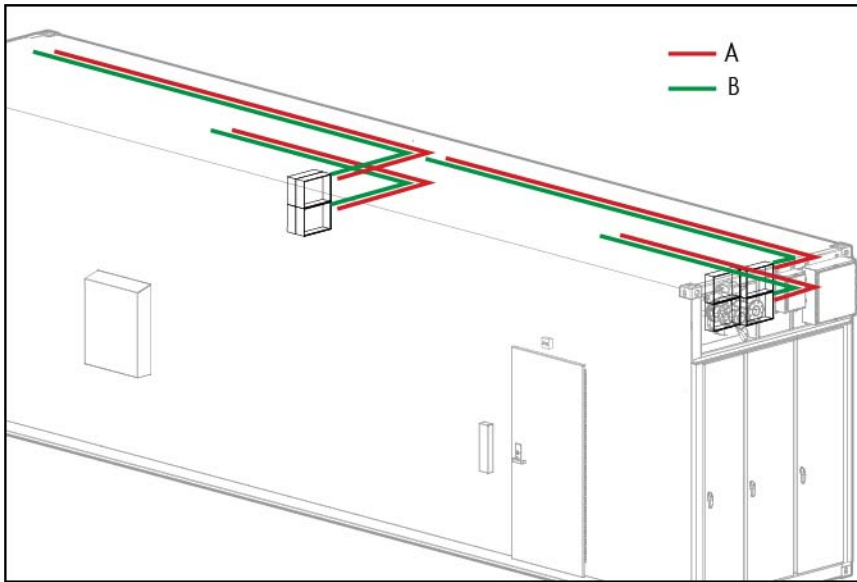
Drop boxes

The internal electrical busways provide a location to connect each of the drop boxes, which then power the PDUs. Stagger the drop boxes on the electrical busways by connecting one drop box to busway #1 and connecting the next drop box to busway #2. A staggered configuration enables load balancing with the rack equipment and is necessary to ensure redundancy.

Side view shown
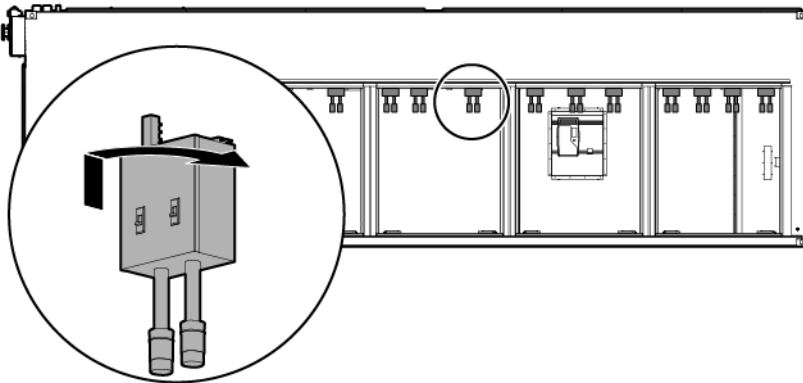
Disabling power

- To disable power to a single PDU, open the drop box breaker that powers the PDU, and then disconnect the PDU from the drop box.

- To disable power to a single rack, open the drop box breakers that power each of the PDUs installed in that rack.

- To disable power to a single busway, open the appropriate breaker for that busway on the corresponding electrical busway panel on the HP POD 40c G2 exterior.

- To disable power to all racks, open the breaker for each busway on the corresponding electrical panel on the HP POD 40c G2 exterior.

Power configurations

> **IMPORTANT:** Different PDUs can alter the average power capacity per rack.

Configuration	Number of 3-phase PDUs per HP POD 40c G2	Number of drop boxes per HP POD 40c G2	Average power capacity per rack	Total HP POD 40c G2 power capacity
Non-redundant	40	24	30	600 kW*
Redundant	40	24	20	400 kW*

*The HP POD 40c G2 is mechanically cooling limited to N=600 kW / N+1=400 kW

Rack power

Power is provided to each rack by PDUs and drop boxes. The PDUs are powered by the drop boxes attached to each electrical busway. For more information about electrical busway drop boxes, see the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide*.

Feature	Specification
Rack type	HP POD 40c G2 rack
Max number of racks	20
Max U space per rack	50U
Max U space per HP POD 40c G2	1,000U
Server capacity	600 kW power capacity
Average capacity per rack	30 kW
Peak capacity per rack	69 kW
Voltage to rack	240 V
Rack configuration	Redundant/non-redundant capabilities
Total number of PDUs	40 (two per rack)
Max power per PDU	30 A = 17 kW; 60 A = 34 kW
Max load (chilled POD cooling mode)*	600 kW
Airflow per rack (chilled POD cooling mode)	2,000 CFM average

*Dependent on configuration

HP POD 40c G2 lighting

The HP POD 40c G2 includes eight LED lights. Four lights are located in the cold aisle and four lights are located in the hot aisle.

A light switch is located at every personnel door. For more information on light switch locations, see "Life safety component identification (on page 9)."

All emergency lights are tied to the battery backup power, keeping the interior of the HP POD 40c G2 illuminated during a power outage or emergency.

For more information about the LED lights, see the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide.*

Environmental control system

Environmental control system overview

The ECS developed for the HP water-cooled POD is a stand-alone control system that requires no external connections with an external site system, BMS, public or private Internet sites, cloud, or wireless system to properly control the POD operation.

The ECS includes Modbus TCP/IP connections through which a variety of data can be retrieved. These capabilities enable you to connect, at your expense, with the stand-alone ECS system to monitor the operating parameters of the POD. It is your responsibility (or your representative's or agent's responsibility) to integrate this communication capability into any existing BMS or monitoring system.

> △ **CAUTION:** To ensure that alarm conditions can be identified and resolved, HP recommends that you remotely monitor all alarm conditions. Failure to monitor the alarm conditions can cause delays in appropriate action during an alarm condition.

Using the ECS

HP recommends connecting the HP POD 40c G2 to your facility BMS and establishing communication through the Ethernet cable connected to the external communications box. For more information, see "Configuring the ECS (on page 37)."

The HP POD 40c G2 ECS is a Windows-based system with the following features:

- Intel Core Duo processor
- 15-inch touchscreen
- 512 MB RAM
- 80 GB hard drive
- 24 V DC power supply
- One serial port
- Four USB ports
- 1x10/100 BASE-T and 1x10/100/1000 BASE-T Ethernet connectors

The standard ECS protocol, Modbus TCP/IP, is a data communication protocol for building automation and control networks. Connecting across different protocols might require additional engineering labor and coordination between your in-house control manufacturer and HP. It is your responsibility to make the connection between the HP POD 40c G2 and a BMS system.

The ECS provides the following:

- A supported communication interface that can monitor and control certain HP POD 40c G2 components remotely
- Immediate notification of all supported alarm messages

By connecting your HP POD 40c G2 to a BMS system, you can monitor the various parameters and alarms. For more information, see "Navigating the ECS interface (on page 41)." The complete list of parameters and alarms that can be monitored will be discussed with your facilities personnel.

📝 **IMPORTANT:** If your site does not have a BMS, HP POD 40c G2 ECS data can be sent to and viewed from a set IP address. Communication occurs through an Ethernet cable that is connected to the demarcation box (on page 63).

Satellite control boxes

The satellite control boxes facilitate communication from the ECS to the cooling system fans. Each satellite control box controls the fans in the zone that corresponds with its location.

The HP POD 40c G2 has six satellite control boxes, one box per cooling zone.

Top view shown
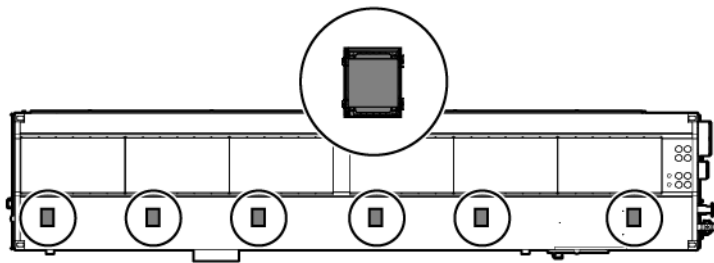
Sensors

The HP POD 40c G2 has several temperature and pressure sensors that monitor the environmental factors and communicate data back to the ECS.

- The values from the temperature sensors are calculated together to determine an average temperature for each aisle of the HP POD 40c G2.

- The pressure sensors measure the differential pressure between the hot aisle and the cold aisle.

Cold aisle sensors

Top view shown
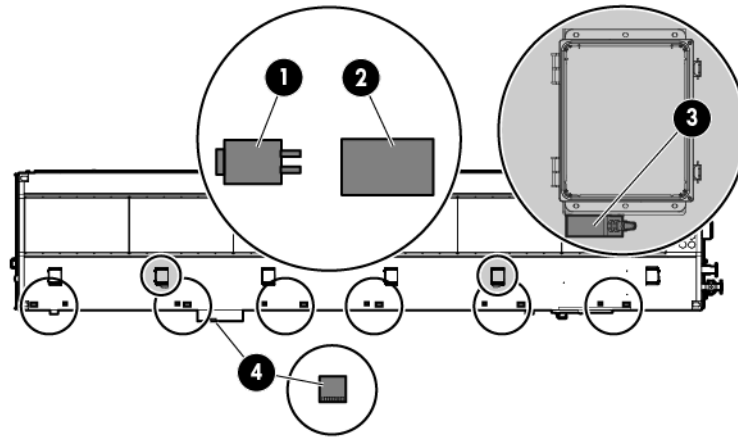
Item	Sensor	Quantity	Description
1	Differential pressure sensor probes	12	• Monitors the hot and cold aisle differential pressure and the air filter differential pressure in various locations throughout the HP POD 40c G2 • Reports data to the ECS
2	Temperature sensors	6	• Monitor the temperature in various locations throughout the cold aisle of the HP POD 40c G2 • Reports data to the ECS
3	Humidity sensors	2	• Monitors humidity for the cold aisle • Reports data to the ECS
4	Humidistat	1	• Monitors humidity for the cold aisle • Reports data to the humidifier control For more information, see "Humidifier (on page 65)."

Hot aisle sensors

Six temperature sensor probes are located in the hot aisle of the HP POD 40c G2. These temperature sensors monitor the temperature in various locations throughout the hot aisle and report data to the ECS.

Top view shown
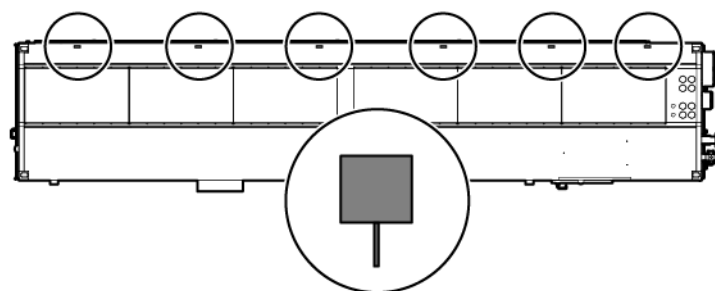
Heat exchanger temperature sensors

There are two contact temperature sensors per heat exchanger. One temperature sensor is located on the inlet supply piping and one temperature sensor is located on the outlet return piping. These sensors measure water temperature and report data to the ECS.

Top view shown
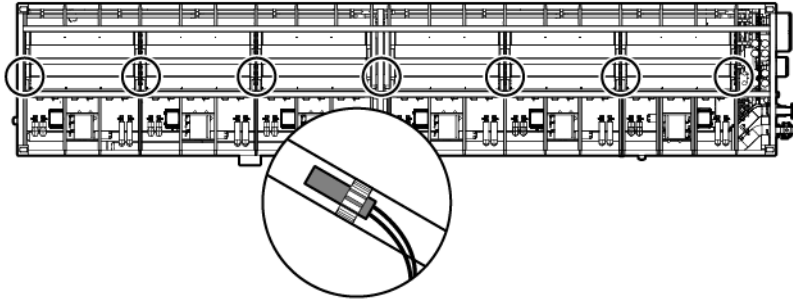
Facility connections to ECS

You can connect your facility to the ECS using the RJ45 located in the demarcation box (on page 63) or cables that are hard-wired through the two 5.08 cm (2 in) portals on the roof of the utility end of the HP POD 40c G2. The system uses Modbus TCP/IP for communication.

Connecting to the ECS

To connect the network to the ECS control panel, route an Ethernet cable to the appropriate RJ45 connector inside the HP POD 40c G2 demarcation box (on page 63).

End view shown
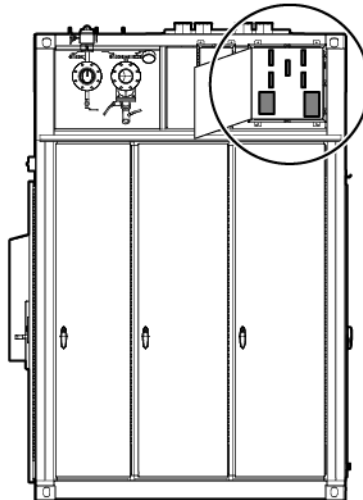
Managing the ECS from the HP POD 40c G2

The ECS interface is viewed directly from the ECS screen on the control cabinet door in the cold aisle. For more information, see "ECS touchscreen and EPO indicators (on page 17)."

To access the ECS using a host computer, connect an Ethernet cable between the host computer and the designated ECS jack on the back of the door inside of the control cabinet.
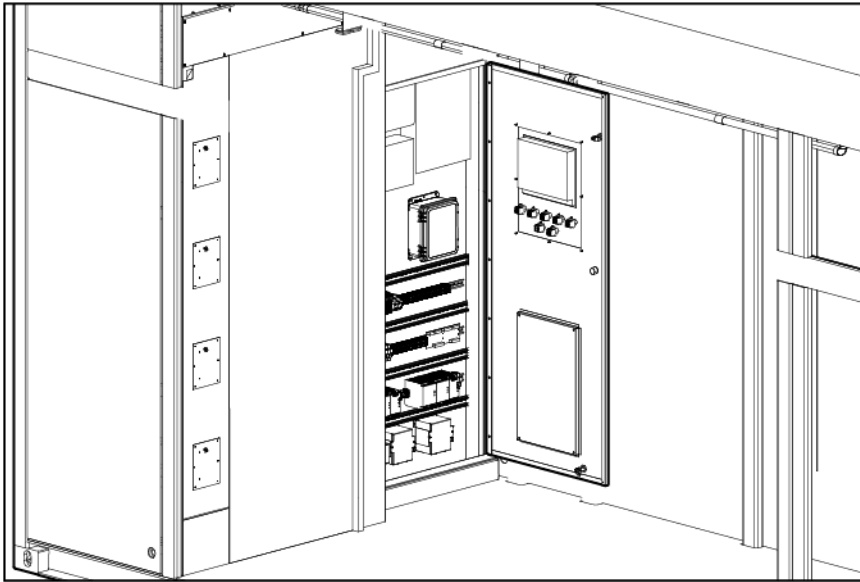
Configuring the ECS

1. Connect a host computer to the ECS. For more information, see "Managing the ECS from the HP POD 40c G2 (on page 37)."

2. Configure your computer network groups:

   a. Select **Start>Control Panel>Network Connections**.
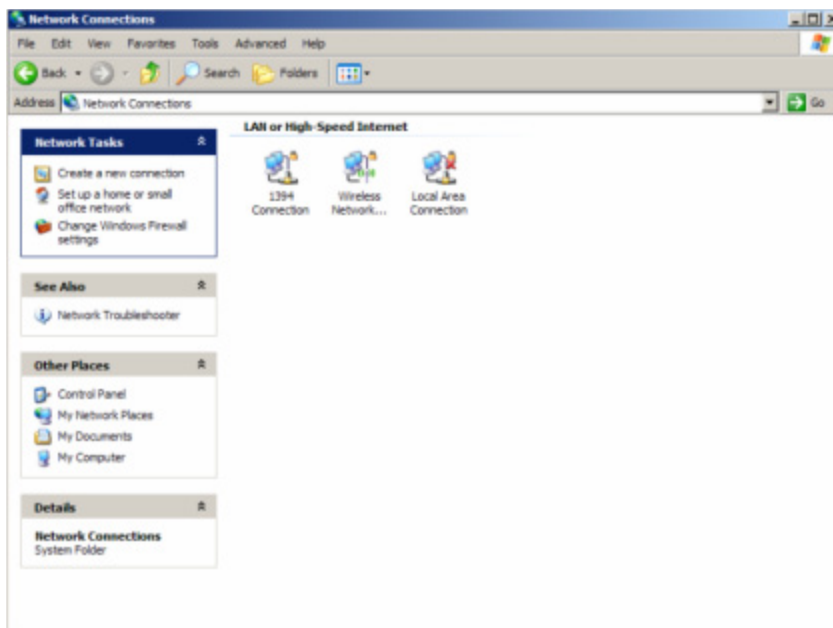
b. Double-click **Local Area Connection**.

c. Select **Internet Protocol (TCP/IP)**.

d. Click **Properties**.
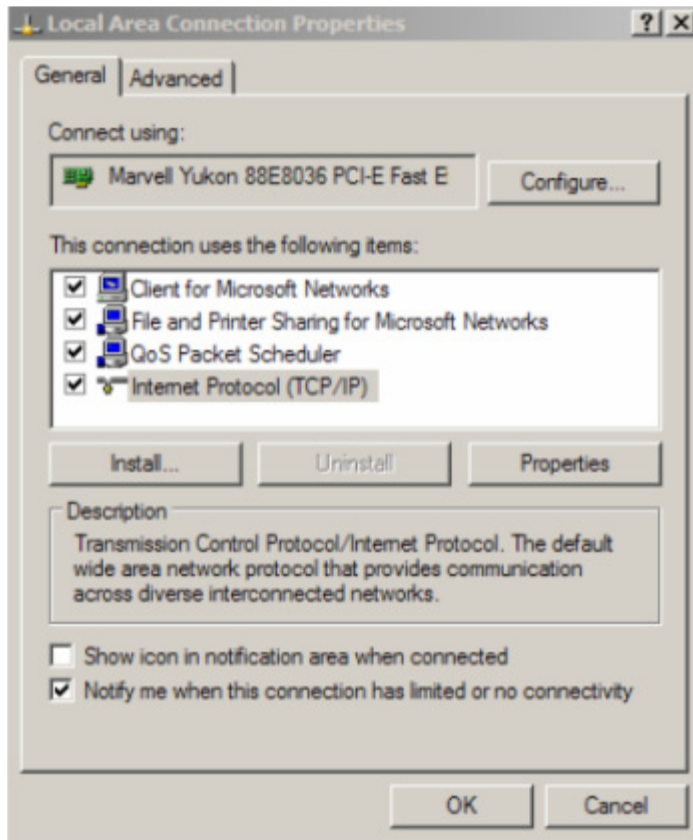
e. Select **Use the following IP address**.

f. Enter the new IP address. Be sure to specify an IP address in the same network group as the ECS controller. By default, the ECS controller uses 192.168.20.1. The IP address for your computer can include any number in the group from 2 to 254.
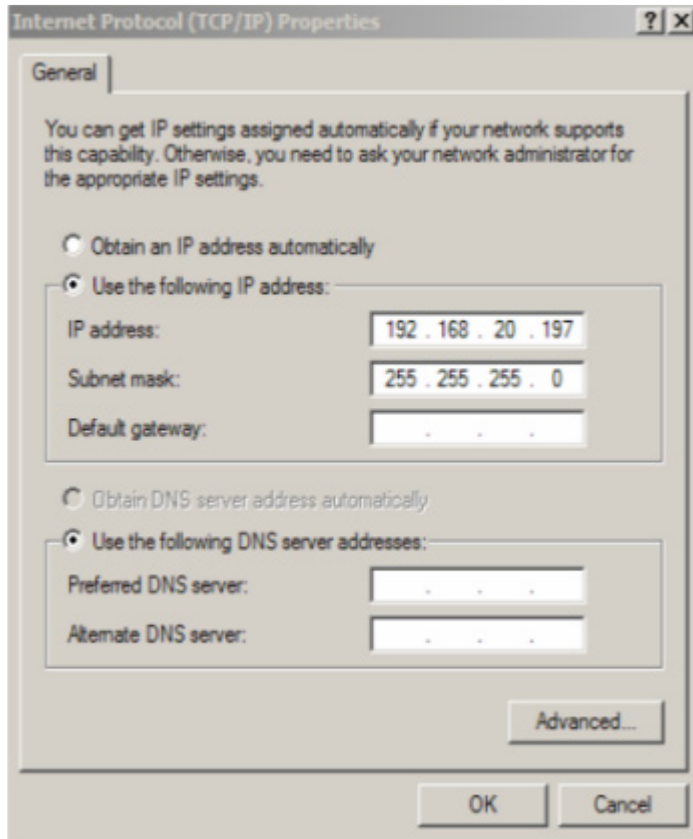
g. Click **OK**.

3. Click **OK** to save changes and close the TCP/IP Properties screen.

4. Click **OK** to close the Local Area Connections Properties screen.

Logging in remotely to the ECS

Before you can log in remotely, you must do the following:

- Add the PLC to a network

- Obtain a username and password

- Obtain the static IP address of the PLC. For more information, see "Locating the ECS IP addresses (on page 40)."

Use the remote desktop application to log in to the ECS remotely:

1. On the remote computer, select **Start> All Programs> Accessories> Remote Desktop Connection**.

The Remote Desktop window appears.

2. In the Computer field, enter the IP address for the PLC.

3. In the User name field, enter the user name.

IMPORTANT: When logging in to the Remote Desktop, the default user name is `Administrator` and the default password is `1`.

4. Click **Connect**.
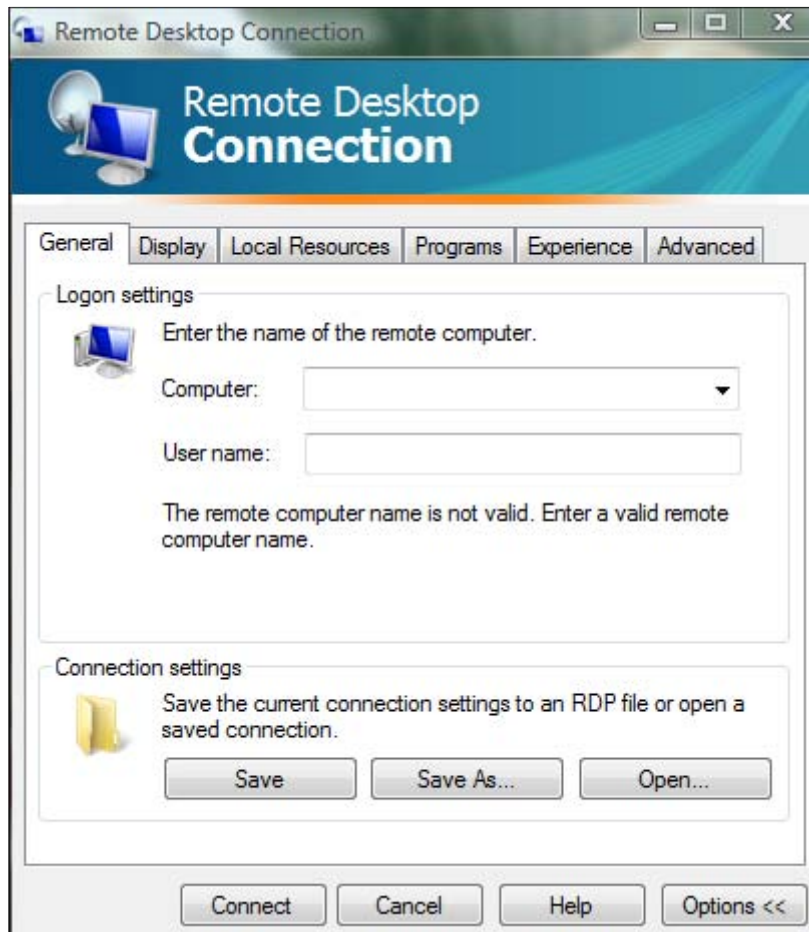
Locating the ECS IP addresses

IMPORTANT: The ECS has three NIC addresses: 10.10.10.1, 10.10.10.2, and an IP address that is set up by the customer for external communication.

The PLC must be connected to locate the IP address for each NIC. For more information, see "Managing the ECS from the HP POD 40c G2 (on page 37)."

To locate the ECS IP address:

1. Select **Start>Run**.

2. Enter `ipconfig`.

The IP address appears.

-or-

1. Select **Start>Network and Sharing Center**.

2. Right-click Local Area Network.

3. Click the **Support** tab.

The IP address appears.

Password protection

The ECS has two levels of security:

- Customer
- Service

The following screens are available using the customer-level password:

- Overview screen (on page 43)
- Status overview screen (on page 45)
- Basic System Configuration screen (on page 45)

The following screens require the service-level password:

> △ **CAUTION:** Making changes to the ECS in the service-level area can cause the cooling system components to fail. Only allow authorized, qualified, and trained personnel to change configuration settings in the service-level area of the ECS.

- Advanced System Configuration screen (on page 49)
- Controller Settings screen (on page 53)

Navigating the ECS interface

The ECS interface provides information for several environmental and security conditions that can be monitored and configured from the ECS touchscreen.

To navigate to specific screens from the Overview screen (on page 43), select the button for the appropriate screen.

> **IMPORTANT:** Depending on the ECS configuration, the ECS numbers and screens might vary.
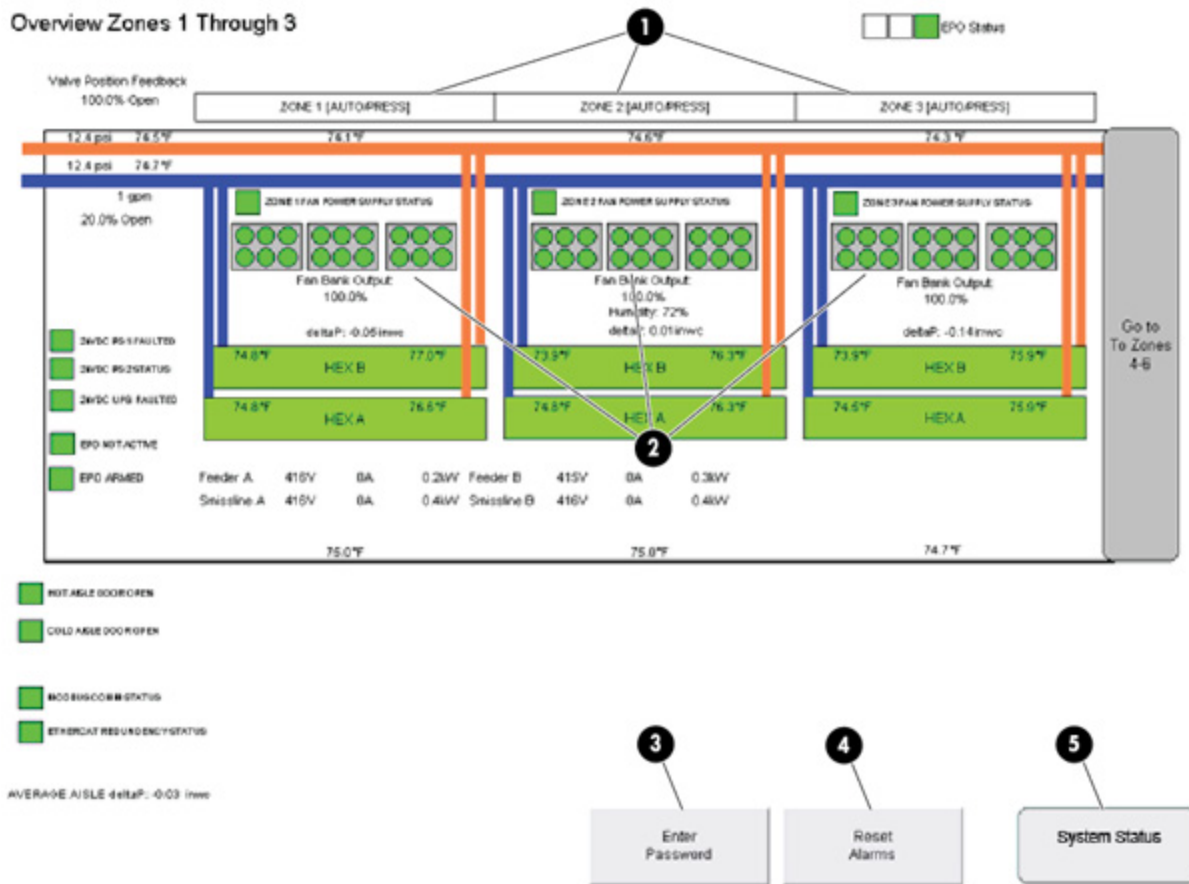
Item	Icon name	Description
1	Zone (#) power supply status	Navigates directly to the Power Details screen for the specified Zone (#)
2	Fan Bank Output	Navigates directly to the Fan Control Detail screen for the specified Zone (#)
3	Enter Password	• Customer-level password—Navigates directly to the Basic System Configuration screen • Service-level password—Navigates directly to the Advanced Configuration screen ("Advanced System Configuration screen" on page 49) or Control Settings screen ("Controller Settings screen" on page 53)
4	Reset Alarms	Resets existing alarm conditions for the POD
5	System Status	Navigates directly to the Status Overview screen (on page 45)

Overview screen

The Overview screen appears upon activation of and displays an overview of the ECS components and the status of each component.

The Overview screen displays the following information.

Information	Description
EPO system status	Indicates the status of the EPO system: • Green—The EPO system is armed and operational. • Red—The EPO system is activated.
Average voltage, current, and power drawn on the A and B busways	Indicates electrical usage
Relative humidity	Indicates the relative humidity percentages from each of the humidity sensors
Differential pressure values	Indicates the differential pressure values from each of the differential pressure zones between the hot aisle and the cold aisle
Door access indicators	Indicates whether an access door is open or closed
Fan speed	Indicates the fan bank speed percentage
Hot aisle temperature	Indicates the average temperature in the hot aisle

Information	Description
Average cooling system performance data	Indicates cooling system sensor averages
System status	Indicates the status of the ECS system: • Green—All components within the ECS system are operating within normal parameters and no active ECS alarms exist. • Red—One or more of the ECS components is indicating an alarm condition.
Manual mode indicators for fans and dampers	Indicates that the fans and dampers are running in manual mode
Fire and Manual override indicators	Indicates whether the fire system is running in manual or override mode

The ECS component icon colors indicate the component status:

- Green—No alarm conditions exist and the component is operating within normal parameters.

- Red—An alarm condition for that component exists.

- Bold numbering on a yellow background—Indicates that an instrument reading is outside of alarm limits.

For more information about alarm conditions, see "ECS alarms (on page 54)."

To navigate to another screen, select one of the buttons at the bottom of the screen. Additional buttons appear when working under the service-level password. The following figure shows the buttons for the service-level password. For more information, see "Navigating the ECS interface (on page 41)."

Status Overview screen

The Status Overview screen displays the status of all system component alarms. For more information about the alarms, see "ECS alarms (on page)."

STATUS Overview

EPO NOT ACTIVE	HUMIDIFIER SYSTEM STATUS	24VDC LIGHTING PS 1 STATUS
EPO ARMED	24VDC PS 1 FAULTED	24VDC LIGHTING PS 2 STATUS
	24VDC PS 2 STATUS	24VDC LIGHTING UPS FAULTED
VESDA SYSTEM FAULTED	24VDC UPS FAULTED	FEEDER A POWER METER STATUS
ZONE 1 FAN STATUS	ZONE 1 HEX A INLET TEMPERATURE FAILURE	SMISSLINE A POWER METER STATUS
ZONE 1 FAN POWER SUPPLY STATUS	ZONE 1 HEX A OUTLET TEMPERATURE FAILURE	FEEDER B POWER METER STATUS
ZONE 2 FAN STATUS	ZONE 1 HEX B INLET TEMPERATURE FAILURE	SMISSLINE B POWER METER STATUS
ZONE 2 FAN POWER SUPPLY STATUS	ZONE 1 HEX B OUTLET TEMPERATURE FAILURE	
ZONE 3 FAN STATUS	ZONE 2 HEX A INLET TEMPERATURE FAILURE	ZONE 1 DIFF.-PRESSURE FAILURE
ZONE 3 FAN POWER SUPPLY STATUS	ZONE 2 HEX A OUTLET TEMPERATURE FAILURE	ZONE 2 DIFF.-PRESSURE FAILURE
ZONE 4 FAN STATUS	ZONE 2 HEX B INLET TEMPERATURE FAILURE	ZONE 3 DIFF.-PRESSURE FAILURE
ZONE 4 FAN POWER SUPPLY STATUS	ZONE 2 HEX B OUTLET TEMPERATURE FAILURE	ZONE 4 DIFF.-PRESSURE FAILURE
ZONE 5 FAN STATUS	ZONE 3 HEX A INLET TEMPERATURE FAILURE	ZONE 5 DIFF.-PRESSURE FAILURE
ZONE 5 FAN POWER SUPPLY STATUS	ZONE 3 HEX A OUTLET TEMPERATURE FAILURE	ZONE 6 DIFF.-PRESSURE FAILURE
ZONE 6 FAN STATUS	ZONE 3 HEX B INLET TEMPERATURE FAILURE	ZONE 1 HEX WATER PAN
ZONE 6 FAN POWER SUPPLY STATUS	ZONE 3 HEX B OUTLET TEMPERATURE FAILURE	ZONE 2 HEX WATER PAN
ZONE 1 COLD AISLE TEMPERATURE FAILURE	ZONE 4 HEX A INLET TEMPERATURE FAILURE	ZONE 3 HEX WATER PAN
ZONE 2 COLD AISLE TEMPERATURE FAILURE	ZONE 4 HEX A OUTLET TEMPERATURE FAILURE	ZONE 4 HEX WATER PAN
ZONE 3 COLD AISLE TEMPERATURE FAILURE	ZONE 4 HEX B INLET TEMPERATURE FAILURE	ZONE 5 HEX WATER PAN
ZONE 4 COLD AISLE TEMPERATURE FAILURE	ZONE 4 HEX B OUTLET TEMPERATURE FAILURE	ZONE 6 HEX WATER PAN
ZONE 5 COLD AISLE TEMPERATURE FAILURE	ZONE 5 HEX A INLET TEMPERATURE FAILURE	ZONE 1 CHILL WATER WATER PAN
ZONE 6 COLD AISLE TEMPERATURE FAILURE	ZONE 5 HEX A OUTLET TEMPERATURE FAILURE	ZONE 6 CHILL WATER WATER PAN
ZONE 1 HOT AISLE TEMPERATURE FAILURE	ZONE 5 HEX B INLET TEMPERATURE FAILURE	CHILLED WATER SUPPLY TEMPRATURE FAILURE
ZONE 2 HOT AISLE TEMPERATURE FAILURE	ZONE 5 HEX B OUTLET TEMPERATURE FAILURE	CHILLED WATER RETURN TEMPRATURE FAILURE
ZONE 3 HOT AISLE TEMPERATURE FAILURE	ZONE 6 HEX A INLET TEMPERATURE FAILURE	CHILLED WATER SUPPLY PRESSURE FAILURE
ZONE 4 HOT AISLE TEMPERATURE FAILURE	ZONE 6 HEX A OUTLET TEMPERATURE FAILURE	CHILLED WATER RETURN PRESSURE FAILURE
ZONE 5 HOT AISLE TEMPERATURE FAILURE	ZONE 6 HEX B INLET TEMPERATURE FAILURE	ZONE 2 HUMIDITY FAILURE
ZONE 6 HOT AISLE TEMPERATURE FAILURE	ZONE 6 HEX B OUTLET TEMPERATURE FAILURE	ZONE 5 HUMIDITY FAILURE

Go to Zones 1-3	Go to Zones4-6	Reset Alarms

The ECS component icon colors indicate the component status:

- Green—No alarm conditions exist and the component is operating within normal parameters.
- Red—An alarm condition for that component exists.

Basic System Configuration screen

> **IMPORTANT:** The ECS parameters must be set by qualified service personnel only.

The Basic System Configuration screen enables you to configure the basic alarm parameters and the definition of units. The configured parameters are used to trigger an ECS alarm only and do not configure the cooling system.

Basic System Configuration 1779s active   [LOGOUT]

Cold Aisle Low Alarm Temperature 0.0°C	Cold Aisle High Alarm Temperature 30.0°C	Chilled Water Supply Pressure Low Alarm 0.5bar	Chilled Water Supply Pressure High Alarm 6.5bar
Hot Aisle Low Alarm Temperature 0.0°C	Hot Aisle High Alarm Temperature 55.0°C	Chilled Water Return Pressure Low Alarm 0.5bar	Chilled Water Return Pressure High Alarm 5.0bar
Humidity Low Alarm 10.0%	Humidity High Alarm 85.0%	Chilled Water Supply Low Alarm Temperature 0.0°C	Chilled Water Supply High Alarm Temperature 25.0°C
Difference Pressure Low Alarm -2.0mbar	Difference Pressure High Alarm 10.0mbar	Chilled Water Return Low Alarm Temperature 10.0°C	Chilled Water Return High Alarm Temperature 30.0°C

Dimensions
IMPERIAL

Panel Software: 40ft_HP_HQ_POD_REV_V1B

| Go to Zones 1-3 | Go to Zones 4-6 | Advanced Configuration | Controller Settings | Save |

You can select and configure the following parameters:

- Cold aisle temperature alarm parameters
- Hot aisle temperature alarm parameters
- Humidity alarm parameters
- Differential pressure alarm parameters
- Chilled water supply pressure parameters
- Chilled water supply temperature parameters
- Chilled water return temperature parameters
- Type of units displayed

You must select **Save** to store the parameter changes in the system configuration file. If you do not save your changes, the old parameters stored in the configuration file reload when the system starts.

Configuring the cold aisle temperature alarm parameters

The current temperature parameters appear on the related buttons.

To configure the cold aisle low temperature alarm parameters:

1. Select **Cold Aisle Low Alarm Temperature**.

   A keypad appears.

2. Enter a temperature alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

To configure the cold aisle high temperature alarm parameters:

1. Select **Cold Aisle High Alarm Temperature**.

   A keypad appears.

2. Enter a temperature alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

Configuring the hot aisle temperature alarm parameters

The current temperature parameters appear on the related buttons.

To configure the hot aisle low temperature alarm parameters:

1. Select **Hot Aisle Low Alarm Temperature**.

   A keypad appears.

2. Enter a temperature alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

To configure the hot aisle high temperature alarm parameters:

1. Select **Hot Aisle High Alarm Temperature**.

   A keypad appears.

2. Enter a temperature alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

Configuring the humidity alarm parameters

The current relative humidity parameters appear on the related buttons.

To configure the low humidity parameters:

1. Select the **Humidity Low Alarm**.

   A keypad appears.

2. Enter a humidity alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

To configure the high humidity parameters:

1. Select the **Humidity High Alarm**.

   A keypad appears.

2. Enter a humidity alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

Configuring the differential pressure alarm parameters

The current differential pressure parameters appear on the related buttons.

To configure the low differential pressure parameters:

1. Select **Difference Pressure Low Alarm**.

    A keypad appears.

2. Enter a differential pressure alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

To configure the high differential pressure parameters:

1. Select **Difference Pressure High Alarm**.

    A keypad appears.

2. Enter a differential pressure alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

Configuring the chilled water supply pressure alarm parameters

The current differential pressure parameters appear on the related buttons.

To configure the chilled water supply pressure low alarm parameters:

1. Select **Chilled Water Supply Pressure Low Alarm**.

    A keypad appears.

2. Enter a differential pressure alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

To configure the chilled water supply pressure high alarm parameters:

1. Select **Chilled Water Supply Pressure High Alarm**.

    A keypad appears.

2. Enter a differential pressure alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

Configuring the chilled water supply pressure alarm parameters

The current chilled water return pressure alarm parameters appear on the related buttons.

To configure the chilled water return pressure low alarm parameters:

1. Select **Chilled Water Return Pressure Low Alarm**.

    A keypad appears.

2. Enter a chilled water return pressure alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

To configure the chilled water return pressure high alarm parameters:

1. Select **Chilled Water Return Pressure High Alarm**.

    A keypad appears.

2. Enter a chilled water return pressure alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

Configuring the chilled water supply temperature alarm parameters

The current temperature parameters appear on the related buttons.

To configure the chilled water supply low temperature alarm parameters:

1. Select **Chilled Water Supply Low Alarm Temperature**.

   A keypad appears.

2. Enter a temperature alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

To configure the chilled water supply high temperature alarm parameters:

1. Select **Chilled Water Supply High Alarm Temperature**.

   A keypad appears.

2. Enter a temperature alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

Configuring the chilled water return temperature alarm parameters

The current temperature parameters appear on the related buttons.

To configure the chilled water return low temperature alarm parameters:

1. Select the **Chilled Water Return Low Alarm Temperature**.

   A keypad appears.

2. Enter a temperature alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

To configure the chilled water return high temperature alarm parameters:

1. Select the **Chilled Water Return High Alarm Temperature**.

   A keypad appears.

2. Enter a temperature alarm parameter.

3. Select **Save** to store the new parameters in the system configuration file.

Setting the dimensions of the ECS

To set the dimensions of the ECS:

1. Select **Dimensions**.

2. Select the dimensions **(metric or imperial)** to be displayed throughout the ECS interface.

3. Select **Save**.

Advanced System Configuration screen

You can only access this screen after you have entered a service-level password.

The Advanced System Configuration screen displays the static IP address for each power meter, fan controls, and other details about the HP POD 40c G2.

Advanced System Configuration 1791s active LOGOUT

Flowmeter Calibration Factor 1.0	IP Address Measurement Smissline A 169.10.10.5
Calibrate Chilled Water Pressure Sensors NOT AVAILABLE	IP Address Measurement Smissline B 169.10.10.7
Calibrate Differential Pressure Sensors NOT AVAILABLE	IP Address Measurement Feeder A 169.10.10.4
Enable/Disable Power Measurement ENABLED	IP Address Measurement Feeder B 169.10.10.6

FAN CONTROL ZONE 1
[AUTO/PRESS] 100.0

FAN CONTROL ZONE 2
[AUTO/PRESS] 100.0

FAN CONTROL ZONE 3
[AUTO/PRESS] 100.0

FAN CONTROL ZONE 4
[AUTO/PRESS] 100.0

FAN CONTROL ZONE 5
[AUTO/PRESS] 100.0

FAN CONTROL ZONE 6
[AUTO/PRESS] 100.0

VALVE CONTROL
[AUTO] 20.0

Switchboard S/N

POD S/N
3U92080001

Panel Software: 40ft_HP_HQ_POD_REV_V1B

| Go to Zones 1-3 | Go to Zones 4-6 | Basic Configuration | Controller Settings | Save |

Perform the following tasks on this screen:

- Configure the IP address for each power meter
- Control the fans in each zone
- Control the valve
- Configure the HP POD 40c G2 serial number
- Configure the switchboard serial number
- Calibrate the flowmeter
- Calibrate the chilled water and differential pressure sensors
- Enable or disable power measurement

You must select **Save** to store the parameter changes in the system configuration file. If you do not save your changes, the old parameters stored in the configuration file reload when the system starts.

⚠ **CAUTION:** Making changes to the ECS in the service-level area can cause the cooling system components to fail. Only allow authorized, qualified, and trained personnel to change configuration settings in the service-level area of the ECS.

Calibrating the flowmeter

This option enables flow rate calibration based on the value of a calibrated flow meter.

To calibrate the flowmeter:

1. Power down the HP POD 40c G2. For more information, see "Power down procedure (on page 70)."
2. Select **Flowmeter Calibration Factor**.

   A keypad appears
3. Enter the calibration factor.
4. Select **OK**.
5. Select **Save** to store the new parameters in the system configuration file.

Calibrating the chilled water pressure sensors

This option is available only when the flow rate is zero and the chilled water pressure on the chilled water supply and return lines is less than 12.75 psi. (1.5 bar).

To calibrate the chilled water pressure sensors:

1. Power down the POD. For more information, see "Power down procedure (on page 70)."
2. Vent the exterior chilled water vent valves to relieve pressure.
3. Verify that the ECS Overview screen (on page 43) indicates a flow rate of 0.0 lpm (0.0 gpm).
4. Select **Calibrate Chilled Water Pressure Sensors**.
5. Note the current calibration factor.
6. Enter `0.1` as the new calibration factor.
7. Select **OK**.
8. Select **Calibrate Chilled Water Pressure Sensor** when the button reads `Available`.
9. Enter the original calibration factor that you noted down in step 5.
10. Select **Save** to exit.

Calibrating the differential pressure sensors

This option is available only when all fans and the IT load are powered off and there is no air flowing inside the HP POD 40c G2.

To calibrate the chilled water pressure sensors:

1. Power down the POD. For more information, see "Power down procedure (on page 70)."
2. Set the fan speed for each fan control zone to **Manual** mode and 0% fan speed. For more information, see "Setting the fan controls for each fan control zone (on page 52)."
3. Open the doors for 5 minutes to equalize the pressure between the hot and cold aisles.
4. Select **Calibrate Differential Pressure Sensors**.
5. Select **Save**.
6. Set the fan speeds to Auto mode.

Enable/disable power management

The current power management setting appears on the Enable/disable Power Management button. To enable or disable power management in the ECS:

1. Select **Enable/disable Power Management**.
2. Select **Save** to store the new parameters in the system configuration file.

Setting the IP address for each power meter

The current, preset static IP address appears above the Change IP address button. Change the IP address of a power meter to network multiple meters together or to resolve an IP address conflict.

To configure a power meter IP address:

1. Select **IP Address Management** for one of the following power meters:
    o   Smissline A
    o   Smissline B
    o   Feeder A
    o   Feeder B

    A keypad appears.
2. Enter the IP address.
3. Select **Save** to store the new parameters in the system configuration file.

Setting the fan controls for each fan control zone

The current fan speed appears on each fan control zone.

> 📝 **IMPORTANT:** HP recommends leaving the fans in AUTO mode during normal operation.

To configure the fan speed:

1. Select **Auto/Press** in the fan control zone you want to change.

    A keypad appears.
2. Enter the fan speed.
3. Select **Save** to store the new parameters in the system configuration file.

Setting the switchboard serial number

To identify the switchboard connected to the HP POD 40c G2, set the switchboard serial number in the ECS:

1. Select **Switchboard S/N**.

    A keypad appears.
2. Enter the switchboard serial number.
3. Select **Save** to store the new parameters in the system configuration file.

Setting the HP POD 40c G2 serial number

If multiple HP POD 40c G2 units are connected to the same facility BMS, enter each HP POD 40c G2 serial number to monitor and display each HP POD 40c G2 ECS independently through the facility BMS.

To set the HP POD 40c G2 serial number in the ECS:

1. Select **POD S/N**.

   A keypad appears.

2. Enter the HP POD 40c G2 serial number. For more information, see "Parts and part number identification (on page 8)."

3. Select **Save** to store the new parameters in the system configuration file.

Controller Settings screen

You can only access this screen after you have entered a service-level password.

The Controller Settings screen displays the control setpoints for each major system component.

You can set the following configuration options:

- Control routine interval
- Chilled water supply and return differential temperature setpoint (default = 12°C (10°F))
- Temperature and pressure setpoints
- Temperature and pressure time constants
- Differential temperature and pressure P and I gain
- Temperature P, I, and D gain

⚠ **CAUTION:** Making changes to the ECS in the service-level area can cause the cooling system components to fail. Only allow authorized, qualified, and trained personnel to change configuration settings in the service-level area of the ECS.

You must select **Save** to store the parameter changes in the system configuration file. If you do not save your changes, the old parameters stored in the configuration file reload when the system starts.

Item	Description
Control routine interval	Sets the interval within seconds when the control routine is activated
Set point temperature/pressure	Sets the temperature and pressure setpoints
Temperature and pressure time constant	Used by the low pass filter to even the measurement values out
P,I, and D gain	Proportional, integral, and differential gains influence the rate of change in the position of the flow control valve or the fan speed in order to reach the pre-determined setpoints.

ECS alarms

The alarms pertaining to the health of the HP POD 40c G2 and its components are relayed through the ECS.

Alarm	Meaning	Solution
Fan failure	One of the fans is not working.	See the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide* or contact HP service if you are still within your service contract.
Sensor failure	One of the sensors is not working.	See the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide* or contact HP service if you are still within your service contract.
Leak detection	The drain pan sensor detects water in the pan.	See the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide* or contact HP service if you are still within your service contract.
Change filter	The return air filters are full.	Replace the return air filters. For more information, see the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide*.
High temperature	The cold aisle temperature has surpassed the setpoint temperature.	1 Verify that you have water flowing into your HP POD 40c G2 and the fans are operating. 2 Contact HP service if you are still within your service contract.
Low temperature	The cold aisle temperature is too low.	1 Verify that all components are operating normally. 2 Contact HP service if you are still within your service contract.

Alarm	Meaning	Solution
EPO	The EPO system activates and the HP POD 40c G2 shut down.	1 Follow the emergency procedures for your facility. 2 After the emergency is cleared, reset the EPO and other HP POD 40c G2 systems.
Differential pressure	The difference in pressure between the hot and cold aisles is above the setpoints.	1 Verify that the cold/hot aisle differential pressures are within the setpoints. 2 Contact HP service if you are still within your service contract.

Safety and security alarms

Alarms pertaining to the safety of the HP POD 40c G2 are (optionally) relayed through your building fire and security dispatch.

Alarm	Meaning	Solution
Fire alarm*	The HP POD 40c G2 detected a fire.	Activate the EPO. Follow the emergency procedures for your facility.
Security alarm (optional)	A security breach occurred.	Follow the emergency procedures for your facility.
EPO	The EPO system activated and the HP POD 40c G2 shut down.	Follow the emergency procedures for your facility.

*The fire alarm is relayed to your building fire and security dispatch only if you have connected your facility to the fire box (on page).

Fire alarm sequence of operations

If a fire alarm is activated by the VESDA system, the HP POD 40c G2 does the following:

1. Sends an alarm signal to the building fire and security dispatch if you have connected your facility to the fire box (on page)
2. Activates the fire strobes and horns, starting the 30-second evacuation alarm
3. Releases the suppression agent after a 30-second delay if the optional fire suppression system is installed

> **IMPORTANT:** To interrupt the fire suppression delay for another 30 seconds, press one of the abort buttons located next to each personnel door.

If a fire alarm is activated by a manual fire pull, the HP POD 40c G2 does the following:

1. Sends an alarm signal to the building fire and security dispatch if you have connected your facility to the fire box (on page)
2. Activates the fire strobes and horns, starting the 30-second evacuation alarm
3. Releases the suppression agent after a 30-second delay if the optional fire suppression system is installed

Cooling system

## HP POD 40c G2 cooling system theory of operation

⚠ **CAUTION:** Using contaminated supply water can cause decreased cooling capacity or disruption in service. The supply water must meet the guidelines stated in the *HP Performance Optimized Datacenter 40c G2 Site Preparation and Requirements Guide*. Damage caused by contaminated supply water is not covered by the warranty.

The HP POD 40c G2 has 12 heat exchangers configured into 6 zones that maintain temperature and cool the equipment installed in the HP POD 40c G2. The HP POD 40c G2 receives chilled water from your facility, cycles the water through the heat exchangers to cool the air, and then the fans circulate the cool air throughout the HP POD 40c G2.

A predetermined differential pressure setpoint between the hot aisle and the cold aisle is factory set. Do not alter the setpoint without consulting HP. The fan speeds are regulated to maintain the differential pressure between the hot and cold aisle and hot aisle temperature. For more information, see "Fans (on page 59)."

The HP POD 40c G2 chilled water flow rate is regulated by the ECS Flow Control Valve that is installed on the POD chilled water return header. The ECS system opens and closes this valve to maintain the differential temperature between the POD supply and return chilled water header temperature.

For more information on the cooling system, see the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide*.
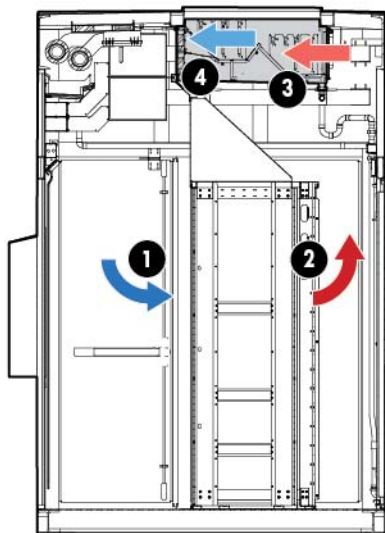
Water supply temperature

The temperature of the water supplied to the HP POD 40c G2 must be 13°C to 24°C (55°F to 75°F). Freezing water can cause a blockage and damage to the POD.

The minimum HP server inlet temperature is 10°C (50°F). For non-HP equipment, consult the documentation for that equipment.

Water quality requirements and specifications

The following are the water quality requirements and specifications:

- Closed-loop water must not contain any lime scale deposits or loose debris.
- The temperature of the chilled water supplied to the HP POD 40c G2 must be 12°C to 24°C (55°F to 75°F).

⚠ **CAUTION:** Freezing water can cause a blockage and damage to the unit. In outside locations that are subject to freezing temperatures, an additive such as glycol might be necessary to lower the freezing point. However, since the heat transfer potential of water with glycol is lower, the HP POD 40c G2 must be de-rated accordingly.

📝 **IMPORTANT:** The chilled water system piping and heat exchangers must be drained completely, and then purged using compressed air when storing or transporting at or below freezing temperatures.

📝 **IMPORTANT:** Operating the chilled water system at the higher end of the acceptable range decreases the overall thermal capacity of the POD.

Acceptable water quality specifications

Water must be maintained per the following acceptable water quality standards.

Parameter	Range
pH	8.0–10
Specific conductance at 25°C (77°F)	10–2500 μmhos
Alkalinity ("M" as $CaCO_3$)	150–1000 ppm
Sulfur (SO_4)	0–150 ppm
Chloride (Cl)	0–100 ppm
Hardness ($CaCO_3$)	0–350 ppm
Calcium hardness ($CaCO_3$)	0–200 ppm
Magnesium hardness ($CaCO_3$)	0–150 ppm
Copper (Cu)	< 0.20 ppm
Iron (Fe)	< 3.0 ppm
Aluminum (Al)	< 0.50 ppm
Sodium (Na)	0–1000 ppm
Silica (SiO_2)	0–150 ppm
Zinc (Zn)	< 1.0 ppm
Manganese (Mn)	< 0.1 ppm
Phosphate Ortho- (PO_4)	< 3 ppm
Bacteria	< 1000 CFU/ml
Suspended solids	< 10 ppm

If your water is out of range, consult a water quality expert.

The following table describes the chilled water system specifications for the HP POD 40c G2.

| Feature	Specification
Facility input temperature to the HP POD 40c G2	12°C to 24°C (55°F to 75°F)
Working pressure	1,034 kPa (150 psi)
HP POD 40c G2 pressure drop	172.4 kPa (25 psi)
HP POD 40c G2 water flow rate	908.5 lpm (240 gpm)
Chilled water supply and return connections	• North America—Two 10.16 cm (4 in) ASME B16.5 class #150 flanges • International—Two DIN PN16 DN100 flanges

Cooling system components

Each of the six heat exchanger area access hatches are rated NEMA 3R for outdoor use. The exterior of the hatches are coated with a durable finish to protect against corrosion. The access hatches are located on the roof of the POD. The heat exchangers can be accessed from the roof of the POD by removing one of the six access hatches.

Top view shown
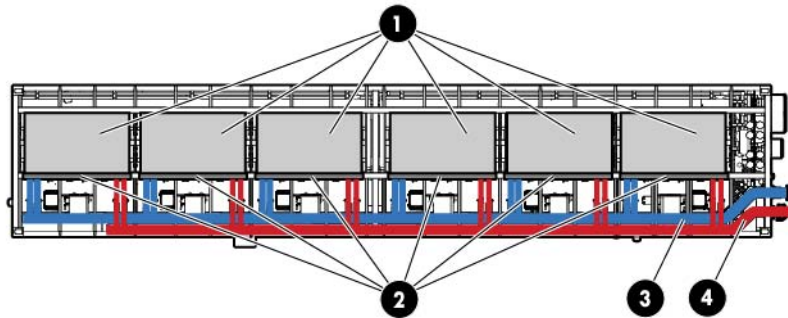
Item	Component	Description
1	Heat exchangers	Use facility chilled water to cool the air in the HP POD 40c G2
2	Heat exchanger fan banks	Operate at variable speeds to maintain the preprogrammed differential pressure setpoint and the hot aisle temperature setpoint
3	Chilled water supply	Supplies facility chilled water to cool the HP POD 40c G2
4	Chilled water return	Returns heated chilled water to the facility

Side view shown
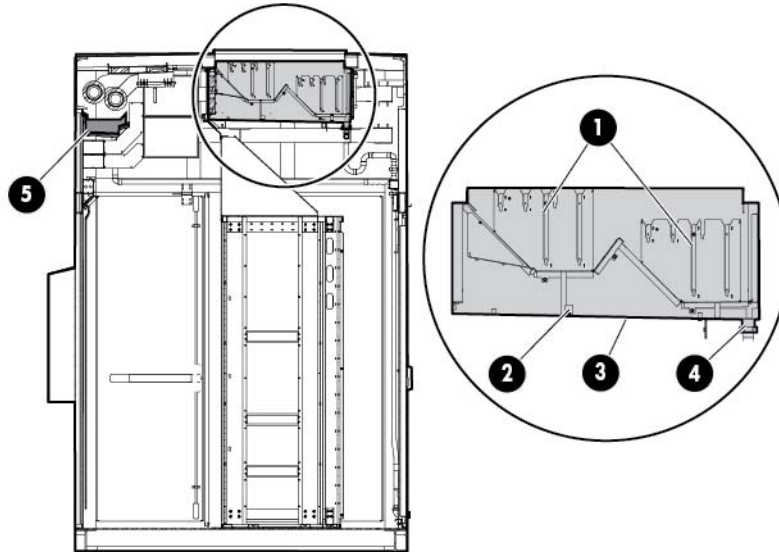
Item	Component	Description
1	Heat exchanger	Use chilled facility water to cool the air in the HP POD 40c G2
2	Drain pan sensor	Detects excessive amounts of condensate in the drain pan and sends an alarm signal to the ECS
3	Drain pan	Collects and directs heat exchanger condensate to the condensate drain
4	Condensation drain	Removes condensation from the drain tray to the exterior of the HP POD 40c G2
5	Header drain pan	Provides leak detection for the chilled water supply and the chilled water supply return

Fans

HP POD 40c G2 fans operate at variable speeds to maintain the following setpoints programmed in the ECS. The setpoints are maintained in the following order:

1. Differential pressure setpoint between the hot and cold aisles
2. Hot aisle temperature setpoint

The fan speed adjusts to maintain both setpoints. Do not manually adjust the fan speed.

IMPORTANT: HP recommends leaving the fans in AUTO mode during normal operation.

Depending on the IT equipment you have installed in your HP POD 40c G2, you can choose to change both default parameters to improve the overall efficiency of your system. To discuss the effects of changing these parameters for your specific HP POD 40c G2, contact HP ("HP contact information" on page 75).
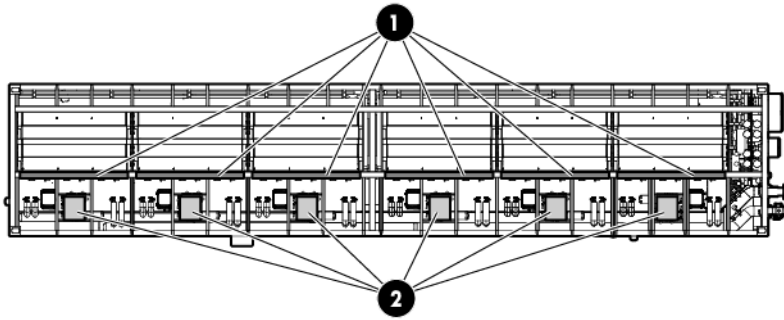
Item	Sensor	Quantity	Description
1	Fans	3 banks of 6 (18 total) fans per zone	Circulates cool air from the heat exchangers throughout the HP POD 40c G2
2	Fan power supply assembly	6	Provides power for the fans

Condensation management

△ **CAUTION:** To maintain accurate environmental conditions inside the HP POD 40c G2, do not leave the HP POD 40c G2 doors open during operation.

The heat exchanger drip pans collect any condensation that forms on the heat exchangers. The collected condensate drains out of the HP POD 40c G2 through the heat exchanger condensate drains. HP recommends connecting the condensate drains on the HP POD 40c G2 to a facility drain to prevent collection of water near the HP POD 40c G2.

The HP POD 40c G2 has two 3.175 cm (1.25 in) condensate drain outlets, one located at each end of the hot aisle of the HP POD 40c G2 directly connected to the heat exchanger drip pans. The HP POD 40c G2 has two drains for the water main supply and return lines located on the front of the POD.

To avoid excessive buildup of condensate and to conserve energy, raise the cooling water temperature to above the dew point to manage condensation while maintaining the necessary cooling capacity.

Drains

⚠ **WARNING:** Water that drains around the HP POD 40c G2 can cause a potential slip hazard. Use caution where slip hazards are present.

Water from natural condensation will form. Condensation from the heat exchangers flows to the condensation drains at each end of the HP POD 40c G2.

The HP POD 40c G2 has two heat exchanger condensate drains.
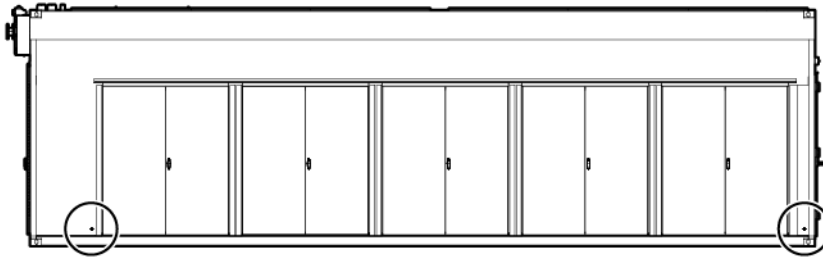
> **IMPORTANT:** You might need to connect the HP POD 40c G2 drain directly to the local storm or sanitary drain, depending on the local jurisdiction.

If your HP POD 40c G2 is located indoors, you can connect to an external drain line. If your HP POD 40c G2 is located outdoors, the drained water drains out the back of the HP POD 40c G2.

HP recommends connecting the condensate drains on the HP POD 40c G2 to a facility drain to prevent collection of water near the HP POD 40c G2.

Leak detection

The HP POD 40c G2 includes six heat exchanger condensate drains. One drain pan sensor is located in the drain tray below each set of heat exchangers.

Two sensors are also located in the header drain pans, one in cooling zone 2 and one in cooling zone 5.

There should be no water in the header drain pan and the drain pan should always remain dry.

Some amount of condensation water can always be expected in the heat exchanger drain pans. If an excessive amount of condensation water accumulates in a drain pan, an alarm is triggered and sent through the HP POD 40c G2 ECS, indicating a possible leak.

For more information on leak detection, see the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide.*

IT networking and communications

Networking

Connecting the HP POD 40c G2 to the facility network is a vital part of ensuring the functionality of the various communication systems. See the *HP Performance Optimized Datacenter Networking Guide* for more information.

All connections are the responsibility of the customer. For configuration and installation instructions, consult with HP.

Connection portals

There are networking and connection portals located on the top of the utility-end of the HP POD 40c G2. These portals are provided to allow the customer to make connections to the HP POD 40c G2.

Each HP POD 40c G2 has 10 portals, which are shown in the following figure and described in the following table. The connection portal location and configuration might vary, depending on the HP POD 40c G2 model.

Top view shown
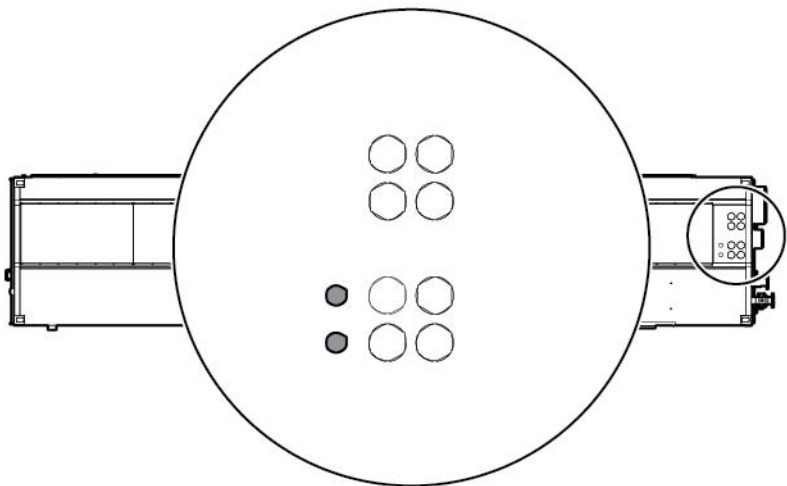
Connection portal diameter	Connection point	Quantity
10.16 cm (4 in) portal	Main electrical power feeds	8

Connection portal diameter	Connection point	Quantity
5.08 cm (2 in) portal	Communication connection for all communication • ECS • EPO • Fire alarm • Telephone	2

Demarcation box

The following communication connections between the customer facility and the HP POD 40c G2 are made through the demarcation box:

- ECS communication

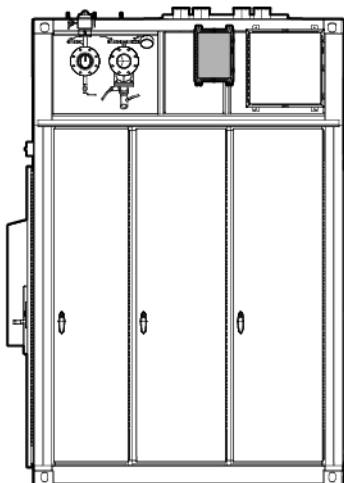- Security communication

- Telephone

End view shown
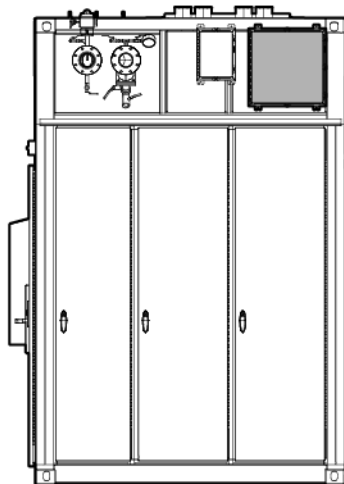
You must make the connections between the facility and the HP POD 40c G2. For configuration and installation instructions, consult with HP.

Fire box

The communication connections between the fire system and the HP POD 40c G2 are made through the fire box.

End view shown

You must make the connections between the facility and the HP POD 40c G2. For configuration and installation instructions, consult with HP.

Optional components

Fire protection system

The fire protection system is a HP POD 40c G2 self-contained system, with no connection to your ECS. The fire protection system consists of 3M Novec 1230, a clean agent fire suppressant, eliminating the need for additional water to be connected to the HP POD 40c G2 in case of a fire emergency.
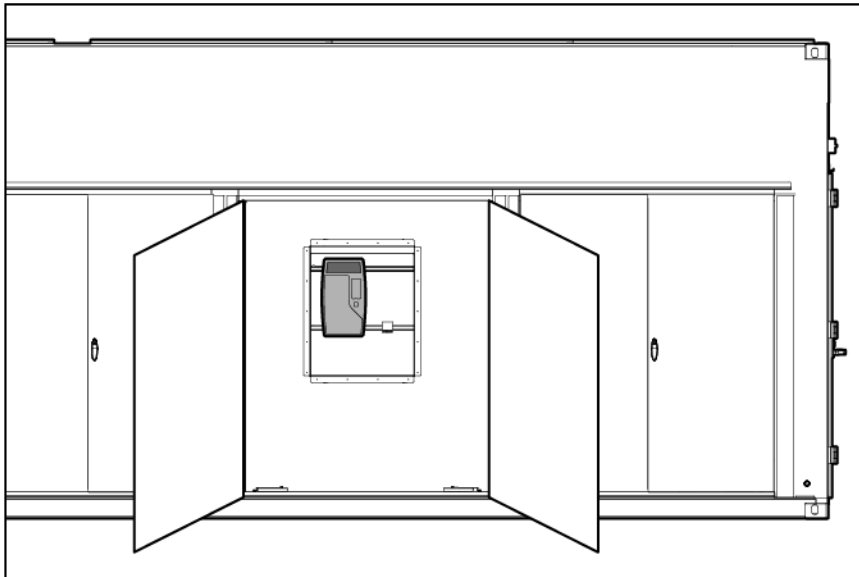
Humidifier

The humidifier option maintains the humidity within the HP POD 40c G2 within a set range, according to ASHRAE standards.

> **IMPORTANT:** The humidifier is required if you want the POD to remain within ASHRAE recommended or allowable standards.

Maintaining the humidity helps to minimize static electricity within the HP POD 40c G2.

Side view shown

Controlled access

The HP POD 40c G2 controlled access option adds magnetic locks and 12-digit keypads to the hot and cold aisle dynamic doors. This option enables you to provide controlled access to the hot and cold aisle without the need for keys.

Power up procedure

Standard HP POD 40c G2 power up procedure

This procedure is for your reference only and assumes that the POD was fully commissioned and powered up by HP before being turned over to you.

Before beginning the power up procedures in this section, verify that the POD is not in operation and that the internal ambient temperature of the POD is greater than 10°C (50°F). If the internal ambient temperature of the POD is less than 10°C (50°F), see "Cold weather HP POD 40c G2 power up procedure (on page 67)."

This process ensures personnel safety during the electrical start up of the HP POD 40c G2.

> ⚠ **WARNING:** To avoid risk of personal injury or loss of life, do not open an energized POD electrical cabinet without an energized work permit and appropriate PPE.

Standard power up checklist

Site electrical

Verify that all POD site power feeder breakers are open.

POD electrical

- Hot aisle

  Verify that all IT power drop box breakers located on the power tap boxes are open.

- Cold aisle

  a. Close all breakers and fuses within the control cabinet.

  b. Close and latch the ECS cabinet with the supplied T-handle.

  c. Position the EPO system to Armed (White) or Bypass (Green) using the EPO key control on the door to the control cabinet.

  d. Verify that the EPO buttons are in the reset position (not depressed).

- IT critical power feed cabinets A and B

  a. Close all fuses in power cabinets A and B.

  b. Close all non-spare breakers in power cabinets A and B.

  c. Close and lock power cabinet doors A and B.

  d. Close and lock the fire suppression cabinet door.

Standard power up procedure

Perform the following procedures in the exact order in which they are listed.

Site electrical

Close all POD site power feeder breakers and monitor for any effects that are not standard.

Site chilled water

1. Open the POD supply chilled water isolation valve.
2. If necessary, vent the air from the chilled water return header.
3. Open the POD return chilled water isolation valve.
4. Verify that audible flow noises are present.

ECS and EPO

Verify the following on using the ECS touchscreen and EPO indicators:

*   The ECS panel is operational and displays the user interface.
*   The POD lighting is operational.
*   The EPO system is set to Armed (White) or Bypass (Green).

POD operation

1. On the ECS touchscreen, verify that all system components are operational (green) and no alarm conditions exist.
2. On the ECS touchscreen, verify that all system parameters are operating normally.
3. On the ECS touchscreen, verify that the POD chilled water flow rate is established on the flow rate indicator.
4. In the hot aisle, close the power drop box breakers for each rack and ensure that the IT equipment is operating.
5. In the cold aisle, monitor the flow control position, chilled water flow, and POD temperatures.
6. Wait 5 minutes to allow the system to stabilize.

The HP POD 40c G2 is now fully operational and the control system automatically controls the fan and the flow control valve position.

Cold weather HP POD 40c G2 power up procedure

This procedure is for your reference only and assumes that the POD was fully commissioned and powered up by HP before being turned over to you.

Before beginning the power up procedures in this section, verify that the POD is not in operation and that the internal ambient temperature of the POD is less than 10°C (50°F). If the internal ambient temperature of the POD is greater than 10°C (50°F), see "Standard HP POD 40c G2 power up procedure (on page 66)."

> **IMPORTANT:** The minimum acceptable inlet temperature for IT equipment is 10°C (50°F).

Follow the same checks and startup procedures as described in "Standard HP POD 40c G2 power up procedure (on page 66)." However, the POD has internal and outdoor ambient temperatures that are below the minimum operational temperatures for servers. The additional steps required are contained in this procedure.

This process ensures personnel safety during the electrical start up of the HP POD 40c G2.

> ⚠ **WARNING:** To avoid risk of personal injury or loss of life, do not open an energized POD electrical cabinet without an energized work permit and appropriate PPE.

Cold weather power up checklist

Site electrical

Verify that all POD site power feeder breakers are open.

POD electrical

- Hot aisle

  Verify that all IT power drop box breakers located on the power tap boxes are open.

- Cold aisle
  a. Close all breakers and fuses within the control cabinet.
  b. Close and latch the ECS cabinet with the supplied T-handle.
  c. Position the EPO system to Armed (White) or Bypass (Green) using the EPO key control on the door to the control cabinet.
  d. Verify that the EPO buttons are in the reset position (not depressed).

- IT critical power feed cabinets A and B
  a. Close all fuses in power cabinets A and B.
  b. Close all non-spare breakers in power cabinets A and B.
  c. Close and lock power cabinet doors A and B.
  d. Close and lock the fire suppression cabinet door.

Cold weather power up procedure

Perform the following procedures in the exact order in which they are listed.

Site electrical

Close all POD site power feeder breakers and monitor for any effects that are not standard.

Site chilled water

1. Open the POD supply chilled water isolation valve.
2. If necessary, vent the air from the chilled water return header.
3. Open the POD return chilled water isolation valve.
4. Verify audible flow noises are present.

> **IMPORTANT:** To allow the POD ambient temperature to be raised in a controlled manner, open the chilled water supply and return isolation valves to enable 908.49 lpm (240 gpm) at a temperature of 13°C to 24°C (55°F to 75°F) to flow through the heat exchangers and allow the circulation fans to bring the ambient temperature to >10°C (50°F).
>
> - Portable heaters can be used to uniformly disperse supplemental heat throughout the POD.
> - Electric portable heaters must be powered from an outside source.

ECS and EPO

Verify the following using the ECS touchscreen and EPO indicators:

- The ECS panel is operational and displays the user interface.
- POD lighting is operational.
- The EPO system is set to Armed (White) or Bypass (Green).

POD heating procedure

1. On the ECS touchscreen, verify that all system components are operational (green) and no alarm conditions exist.
2. On the ECS touchscreen, verify that the POD chilled water flow rate is established on the flow rate indicator.
3. Determine the hot aisle temperature:
   - If the hot aisle temperature is at or above -25°C (13°F), continue to the next step.
   - If the hot aisle temperature is not at or above -25°C (13°F), continue monitoring the hot aisle temperature until it reaches -25°C (13°F) and continue this warm up procedure for 60 minutes before proceeding.
4. Record the cold aisle temperature displayed on the ECS. The recorded temperature is the starting temperature of the servers.

   > **IMPORTANT:** With non-operating servers, the temperature rate of change should not exceed 20°C (68°F) per hour. At higher elevations, the rate of change must be reduced by 1°C (34°F) for every 305 m (1,000 ft) above sea level.

5. When the cold aisle temperature reaches a minimum of 10°C (50°F), maintain the temperature for at least 60 minutes before proceeding.
6. Set the POD chilled water flow control and all fans to AUTO mode.

   > **CAUTION:** Do not continue the start up procedures unless the chilled water flow control valve and the fans are in **AUTO** mode.

POD operation

1. In the hot aisle, close the power drop box breakers for each rack and ensure that the IT equipment is operating.
2. In the cold aisle, monitor the flow control position, chilled water flow, and POD temperatures.
3. Wait 5 minutes to allow the system to stabilize.

The HP POD 40c G2 is now fully operational and the control system automatically controls the fans and the flow control valve position.

Power down procedure

1. Power down all IT equipment.
2. Open all POD power drop box breakers.
3. Monitor the system parameters and allow the POD to cool to an acceptable temperature. Be sure that the cold aisle temperature does not fall below 10°C (50°F.)
4. Close the POD return chilled water isolation valve.
5. Close the POD supply chilled water isolation valve.
6. Open the POD main power feed breakers.
7. Unlock the POD power cabinets A and B.
8. Open all breakers in the POD power cabinets A and B.

The HP POD 40c G2 is now powered down and all breakers are ready for standard or cold weather power up.

Specifications

General HP POD 40c G2 specifications

Features	Specifications
Overall dimensions	- Height—3.66 m (12 ft) - Length—12.19 m (40 ft) - Width—2.43 m (7.97 ft)
Weight[1]	Empty—16,783 kg (37,000 lb) Maximum fully loaded—46,266 kg (102,000 lb)
Maximum power[2]	600 kW HP POD 40c G2
Power input voltage	380 VAC to 415 VAC
Power distribution[3]	8 x 200 A electrical busways
Maximum rack quantity	20 racks
Rack Units (RU) per rack	50 RU
Rack Units (RU) total	1000 RU
Average capacity per rack (kW)	30 kW
Peak rack capacity	69 kW
Voltage to rack	200 VAC to 240 VAC
Minimum quantity of PDUs per HP POD 40c G2	20 (one per rack)
Maximum quantity of PDUs per HP POD 40c G2	40 (two per rack)
Maximum power per PDU	30A = 17 kW; 60A = 34 kW
Network supported	Bulk cable pass-through-fiber Bulk cable pass-through-copper (Optional) External rated DEMARC box

[1]The Empty weight includes the HP POD 40c G2 structure, empty racks, PDUs, and drop boxes. It does not include IT equipment.
[2]The maximum power depends on the exact installation and power configuration in your POD. The HP POD 40c G2 is electrically limited to 600 kW.
[3]The HP POD 40c G2 can be configured for redundancy or non-redundancy.

Electrical specifications

Electrical busway system information

Feature	Specification
Number of busways	8
Frequency	60 Hz
Amps (per busway)	200 A
Voltage (per busway)	380 to 415 V
Grounding	Copper
Busway configuration	3-phase + neutral + equipment ground

Fire alarm panel connections

The electrical layout of the fire alarm system is as described in the schematic drawing supplied with the HP POD 40c G2.

Water specifications

The following table describes the chilled water system specifications for the HP POD 40c G2.

Feature	Specification
Facility input temperature to the HP POD 40c G2	12°C to 24°C (55°F to 75°F)
Working pressure	1,034 kPa (150 psi)
HP POD 40c G2 pressure drop	172.4 kPa (25 psi)
HP POD 40c G2 water flow rate	908.5 lpm (240 gpm)
Chilled water supply and return connections	• North America—Two 10.16 cm (4 in) ASME B16.5 class #150 flanges • International—Two DIN PN16 DN100 flanges

Rack specifications

Standard HP POD 40c G2 racks (AT978A)

Feature	Specification
U height	50U
Width	54.6 cm (21.5 in)
Depth	99 cm (39 in)*
Maximum load weight	1,360.7 kg (3,000 lb)

*This specification indicates the maximum clearance for the cold aisle. Equipment cannot exceed this measurement.

Thermal and air flow performance

Maximum thermal and air flow performance parameters	HP POD 40c G2 specification
Air temperature—Inlet to rack-mounted components)	Dependent on IT configuration and chilled water inlet temperature
Chilled water temperature	12°C to 24°C (55°F to 75°F)
Total rack-mounted component air flow	Variable as required to maintain the hot aisle setpoint temperature and dependent on IT configuration
Heat rejection capacity	600 kW

Environmental specifications

Feature	Specification
Operating temperature	-28°C to 54°C (-18°F to 130°F)

Feature	Specification
Non-operating temperature*	-29°C to 54°C (-20°F to 130°F)
Operating humidity	• 0% to 100% external • 10% to 90% non-condensing internal
Non-operating humidity*	• 5% to 95% relative non-condensing • 39°C (102°F) maximum wet bulb temperature
Operating altitude	-76.2 m to 3,048 m (-250 ft to 10,000 ft)
Non-operating altitude	-76.2 m to 9,144 m (-250 ft to 30,000 ft)

*For non-operating specifications, consider the temperature of computer and IT equipment inside the HP POD 40c G2.

Maintenance

Periodic maintenance

Perform periodic inspections to ensure that the HP POD 40c G2 continues to perform according to design parameters. During periodic inspections, pay special attention to electrical connections and wiring.

For more specific maintenance information, see the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide*.

Sample HP POD 40c G2 maintenance schedule

For detailed maintenance information and schedules, consult with HP services.

The following table is a sample maintenance schedule for an HP POD 40c G2. For more detailed maintenance information, see the *HP Performance Optimized Datacenter 40c G2 Maintenance and Service Guide*.

Component to be inspected	Frequency
Electrical connections and wiring—Visual	Every 30 days
Electrical connections and wiring—Thermal scans	Every 180 days
Condensation and drainage system (leaks)—Visual	Every 30 days
Condensation and drainage system (leaks)—Functional	Every 90 days
Busway interconnects (tightened)	Every 180 days
EPO system	Every 180 days
Third-party OEM components (fire alarm and suppression system, humidifier, and so on)	For more information about the components, see the *Operation and Maintenance manual for the HP Performance Optimized Datacenter 40c G2*.

Contacting HP

Before you contact HP

Be sure to have the following information available before you call HP:

- Active Health System log

  Download and have available an Active Health System log for 3 days before the failure was detected. For more information, see the *HP iLO 4 User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/ilo/docs).

- Onboard Administrator SHOW ALL report (for HP BladeSystem products only)

  For more information on obtaining the Onboard Administrator SHOW ALL report, see the HP website (http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?lang=en&cc=us&objectID=c02843807).

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For United States and worldwide contact information, see the Contact HP website (http://www.hp.com/go/assistance).

In the United States:

- To contact HP by phone, call 1-800-334-5144. For continuous quality improvement, calls may be recorded or monitored.
- If you have purchased a Care Pack (service upgrade), see the Support & Drivers website (http://www8.hp.com/us/en/support-drivers.html). If the problem cannot be resolved at the website, call 1-800-633-3600. For more information about Care Packs, see the HP website (http://pro-aq-sama.houston.hp.com/services/cache/10950-0-0-225-121.html).

Regulatory compliance notices

HP POD 40c G2 regulatory compliance

The HP POD 40c G2 complies with the following regulatory standards.

Standard	Certification level	Standard title
UL 60950	ETL "Listed"	• UL 60950—*Standard for Safety Information Technology Equipment, Part 1: General Requirements*, Issue: 2007/03/27, Edition: 2 • UL 60950—*Standard for Safety Information Technology Equipment, Part 22: Equipment to be Installed Outdoors*, Issue: 2007/04/23, Edition: 1
NFPA 70	ETL "Classified"	NFPA 70—*National Electric Code, 2008 Edition*, © 2008 National Fire Protection Association
NFPA 72	Designed to Comply With	*National Fire Alarm code, 2007 Edition*, © 2006 National Fire Protection Association
NFPA 2001	Designed to Comply With	*NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems, 2008 Edition*, © 2008 National Fire Protection Association
IBC 2009	Designed to Comply With	*2009 International Building Code*, © 2010 International Code Council, Inc.

Safety and NEC compliance

The HP POD 40c G2 is certified to UL 69050-1/IEC 60950-22 as a Modular Data Center Information Technology Product and classified according to the National Electric Code NFPA 70 in accordance with NEC (NA) and IEC (EMEA and APJ). Relevant parts of UL1995 are applied to the air handling features of the product. For more information, see "HP POD 40c G2 regulatory compliance (on page 76)."

The HP POD 40c G2 is not suitable for long-term human occupancy. The HP POD 40c G2 has service access areas for periodic maintenance and service. These areas must be used only by owner-authorized personnel who are trained in the maintenance and service of the HP POD 40c G2 components.

> **IMPORTANT:** Before installing the HP POD 40c G2, consult your local AHJ for applicable codes and to review site-specific location guidelines. If needed, obtain any necessary permits.

Additional considerations for safety and NEC compliance are as follows:

- The HP POD 40c G2 is listed as an Information Technology Equipment Product to UL 60950.

- The HP POD 40c G2 is evaluated as a "non-inhabitable product" that provides "service access" areas for customer-authorized, qualified, and trained service personnel.

- The electrical connections of the HP POD 40c G2 are evaluated as feeder connections for connection to an existing facility, and are not suitable as "service entrance" for connection to the utility.

- The HP POD 40c G2 is designed for stationary installation outdoors in a Pollution Degree 3 environment, in restricted access locations, with field wiring terminals provided for permanent supply connections.

- The HP POD 40c G2 meets the following ratings:

Feature	Specification
Category	Rated Overvoltage Category III
Protection	Surge protection device
Class	Class1
Ambient temperature	2°C to 54°C (35.6°F to 129.2°F)
Relative humidity	0% to 100% humidity

- As part of the overall certification, relevant sections of the International Building Code have been applied as part of the design and evaluation. The current design supports wind loads up to 90 mph.

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Federal Communications Commission notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian notice (Avis Canadien)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Regulatory requirements for EXIT signs

Manufacturers of tritium EXIT signs are "specific licensees," meaning they are licensed by the NRC or an Agreement State. The signs are considered "generally licensed devices," because they are inherently safe enough to be handled or used by anyone with no radiation training or experience. Although purchasers – known as "general licensees" – do not need authorization from the NRC or a state regulatory agency to possess the signs, they are subject to certain regulatory requirements regarding handling, transfer or disposal of the signs. For more information, see the NRC website (http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-tritium.html#_edn2). They are also subject to NRC or Agreement State inspection and enforcement action (including fines) for violating those requirements. Manufacturers must inform purchasers of the EXIT signs of the regulatory requirements for generally licensed devices. The general licensee is required to designate an individual responsible for complying with the regulatory requirements.

Under NRC regulations, a general licensee using tritium EXIT signs:

- must NOT remove the labeling or radioactive symbol, or abandon a sign;

- must properly dispose of an unused sign (see below);

- must report to the NRC or the appropriate Agreement State any lost, stolen or broken signs;

- must inform the NRC or an Agreement State of a name change, change of address or replacement of a general licensee's designated representative;

- must NOT give away or sell the sign to another individual, company or institution unless the device is to remain in use at its original intended location; in such a case, the transferor is to notify the recipient of the regulatory requirements and must notify the NRC or Agreement State of the transfer within 30 days.

Tritium EXIT signs must NOT be disposed of as normal trash. To dispose of a sign properly, a general licensee must transfer the sign to a specific licensee. This would typically be a manufacturer, distributor, licensed radioactive waste broker, or a licensed low-level radioactive waste disposal facility. These facilities may charge a fee for this service.

Within 30 days of disposing of a sign, the general licensee is required to file a report to the NRC or Agreement State that includes:

- the device manufacturer's (or distributor's) name, model number and serial number;

- the name, address, and license number of the person receiving the device; and

- the date of the transfer.

Reports should be sent to Director, Office of Federal and State Materials and Environmental Management Programs, ATTN: GLTS, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

For more information, see the Fact Sheet on Tritium EXIT Signs on the NRC website (http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-tritium.html).

Glossary

AHJ

authority having jurisdiction

branch circuit

The conductors and components following the last overcurrent protective device protecting a load.

control circuit

A circuit that carries the electric signals directing the performance of a controller, and which does not carry the main power circuit.

control transformer

A transformer whose secondary supplies power to control circuit devices only (excluding loads).

cover

An unhinged portion of an enclosure that covers an opening.

CSC

container safety convention

disconnect switch

A device that disconnects all ungrounded conductors of a circuit from their electrical supply.

door

A hinged portion of an enclosure that covers an opening.

ECS

environmental control system

EHS

Environmental, Health, and Safety

EPO

emergency power off

equipment

A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, a modular data center. (Source: NEC.)

fuse, branch circuit type

A fuse of Class CC, G, H, J, K, L, R, and T. These fuses are able to provide branch circuit protection.

fuse, supplementary type

Miscellaneous type and miniature type fuses. These fuses are able to provide supplementary protection only.

labeled

Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

listed

Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards potential of not more than 42.4 V (DC or peak) supplied by a primary battery or by an isolated secondary circuit, and where the current capacity is limited by an overcurrent device, such as a fuse, or by the inherent capacity of the secondary transformer or power supply, or a combination of a secondary winding and an impedance. A circuit derived from a line-voltage circuit by connecting a resistance in series with the supply circuit to limit the voltage and current is not identified as a low-voltage limited energy circuit. or has been tested and found suitable for a specified purpose.

The means for identifying listed equipment might vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

overload protection

Protection required for motor circuits that will operate to prohibit excessive heating due to running overloads and failure to start.

PLC

programmable logic controller

PPE

personal protective equipment

structure

Enclosure of sufficient size to enable entry of personnel.

UPS

uninterruptible power system

Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (mailto:docsfeedback@hp.com). Include the document title and part number, version number, or the URL when submitting your feedback.

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